



# **Cornell University**

## **Courses of Study**

**1983–84**

### **Cornell University Announcements (USPS 132–860)**

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# Cornell University Calendar 1983–84

## Fall Semester

Tuesday, August 23

Monday and Tuesday, August 29 and 30

Wednesday, August 31

Monday, September 12

Wednesday, September 21

Friday–Sunday, September 30–October 2

Saturday, October 15

Wednesday, October 19

Saturday, November 5

Monday–Friday, October 31–November 11

Wednesday, November 23

Monday, November 28

Saturday, December 10

Sunday–Thursday, December 11–15

Friday, December 16

Friday, December 23

## Winter Session

Variable periods between Monday, December 26, and Friday, January 20

## Spring Semester

Monday, January 16

Thursday and Friday, January 19 and 20

Monday, January 23

Monday, February 6

Friday, February 10

Saturday, March 24

Monday, April 2

Monday–Friday, April 9–20

Saturday, May 5

Sunday–Wednesday, May 6–9

Thursday, May 10

Saturday, May 19

Friday–Thursday, May 20–26

Sunday, May 27

## Summer Session 1984

Three-Week Session

Eight-Week Session

Six-Week Session

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 on religious holidays. It is the intent of the University that students missing classes due to the observance of religious holidays be given ample opportunity to make up work.

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

The courses and curricula described in this Announcement, 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 Announcement 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.

New-student orientation begins

Residence halls open

Registration

Instruction begins, 8:00 a.m.

Add/drop/change period begins

Physical education classes begin

Last day of add/drop/change period

Last day for late registration

New-Student Parents' Weekend

Fall recess: instruction suspended, 1:10 p.m.

Instruction resumes, 8:00 a.m.

Homecoming Weekend

Pre-course enrollment for spring 1984

Thanksgiving recess: instruction suspended, 1:10 p.m.

Instruction resumes, 8:00 a.m.

Instruction ends, 1:10 p.m.

Study period

Final examinations begin

Final examinations end

Residence halls close

Residence halls open

Registration

Instruction begins, 8:00 a.m.

Add/drop/change period begins

Physical education classes begin

Last day of add/drop/change period

Spring recess: instruction suspended, 1:10 p.m.

Instruction resumes, 8:00 a.m.

Pre-course enrollment for fall 1984

Instruction ends, 1:10 p.m.

Study period

Final examinations begin

Final examinations end

Residence halls close (students who are graduating may stay through Commencement Day)

Senior week

Commencement Day

Wednesday, May 30–Friday, June 22

Monday, June 11–Tuesday, August 7

Monday, June 25–Tuesday, August 7



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## University Administration

Frank H. T. Rhodes, President of the University  
W. Keith Kennedy, University Provost  
Thomas H. Meikle, Jr., Provost for Medical Affairs  
William G. Herbster, Senior Vice President  
W. Donald Cooke, Vice President for Research  
William D. Gurowitz, Vice President for Campus Affairs  
Robert T. Horn, Vice President and Treasurer  
Robert M. Matyas, Vice President for Facilities and Business Operations  
Richard M. Ramin, Vice President for Public Affairs  
Joan R. Egner, Associate Provost  
Alison P. Casarett, Vice Provost  
Kenneth M. King, Vice Provost  
Larry I. Palmer, Vice Provost  
James W. Spencer, Vice Provost  
Walter J. Relihan, Jr., Secretary of the Corporation and University Counsel  
James A. Sanderson, Chief Investment Officer  
J. Robert Barlow, Special Assistant to the President  
Neal R. Stamp, Senior Counsel to the University  
Joseph B. Bugliari, Dean of the University Faculty

## The University

Cornell University is a community set among the lakes and hills of central New York and lying within the boundaries of the city of Ithaca, New York. Two men were the University's creators: Ezra Cornell and Andrew Dickson White. Cornell had begun his career as a carpenter wandering in search of work. White, the younger, was well educated, a member of America's cultural aristocracy. Cornell came to Ithaca in 1828, worked hard, sometimes failed, more often succeeded, and succeeded to the extent that in the middle 1850s he went out into the American business world. There he met Morse, inventor of the telegraph, became his partner, and was himself soon a wealthy man.

This success led him to the New York State Senate. White, a fellow senator, joined Cornell in discussing their common interest in higher education. They studied the Morrill Act of 1862, which gave land grants to the states as a means of financing state universities, and they saw here the opportunity to launch their own plan for a university. Cornell pledged half a million dollars as more financial support, and a large part of his farm in Ithaca as a university campus. Cornell University was born. The first building, Morrill Hall, opened its doors in 1868.

From the beginning the university had two obligations. First, to offer scholarships to New York State residents; the land-grant money made that necessary. In doing this, Cornell University acted as a public institution. And, as a private institution, it served all comers who could qualify for admission.

What should it teach? White, trained in the classical tradition of the older colleges and universities, wished to teach philosophy, literature, government, history, and the sciences in a contemporary setting, shall we say, in terms of their usefulness to persons going out into the professions and business. Cornell put his wishes in a phrase that has become the University's motto: "I would found an institution where any person can find instruction in any subject."

White was the University's first president. He had assembled a faculty of distinguished scholars from the United States, Canada, and Great Britain, many of whom, including a prominent Oxford professor, came to Cornell because they regarded the University's approach to education as pioneering, lively, and suited to the needs of the time. What more appropriate than that, in this spirit of pioneering, Cornell should admit its first woman students in 1870.

In the last quarter of the nineteenth century the University grew rapidly and began to assume the shape it has today. As it rose to take its place among the so-called Ivy League universities, Cornell had a unique structure, part private and part public; part supported by private funds, part by grants from New York State. On the one hand were the endowed colleges: Arts and Sciences, Engineering, Law, and Architecture; on the other were state-supported or statutory colleges: Veterinary, Agriculture, and Home Economics.

The University drew strength from its two groups of colleges. A single administration, a single president, a single board of trustees presided over the affairs of all; a single body, the University Faculty, directed educational policy. The needs of the endowed colleges called for the services of physicists, chemists, mathematicians, economists, historians, philosophers, biologists, lawyers. The needs of the statutory colleges called for many persons who had similar training, but whose study of mankind and other animals and of plants followed a different path from that of the scholars in the endowed colleges. But this was for the good. The two groups of scholars had common ground for discussion. Out of diversity they could build unity.

By the early twentieth century, Cornell was well on the way to greatness. President White had served as America's ambassador to Russia and to Germany. Schurman, a later president, was to be ambassador to Germany and to China. To the University's faculty came scholars from many countries, as teachers and as students. To join Cornell's undergraduates and graduate students came men and women from all over the world, with the result that the University became what it is today, one of the most cosmopolitan in the United States.

The student population grew from the five to six thousand of the early twentieth century to its present figure of about sixteen thousand; the faculty from about two hundred to the present fifteen hundred. More persons to study, to carry on research, and to teach meant more classrooms and laboratories, more libraries and dormitories, more places for worship and social centers, more playing fields and swimming pools. Buildings and places for outdoor recreation grew up on Ezra Cornell's farm, with a massive art gallery on the very spot where he once stood to admire Cayuga Lake and the city of Ithaca.

This growth of faculty, students, and the facilities they needed led to great specialization in the University's schools and colleges. The Engineering College divided into many parts, such as mechanical, electrical, and chemical, and among the biological sciences there were similar divisions. Among the endowed colleges a School of Hotel Administration appeared, and a Graduate School of Business and Public Administration. Among the statutory colleges the College of Agriculture took a new title, the College of Agriculture and Life Sciences. So did the College of Home Economics; it became the College of Human Ecology. The Veterinary College became the College of Veterinary Medicine. And there was a new school, the School of Industrial and Labor Relations. The process of expansion carried beyond Ithaca. A vast medical school arose in New York City, an agricultural experiment station at Geneva, New York, a marine laboratory off the New England coast, and a government study center at Washington, D.C. More remote is the National Astronomy and Ionosphere Center in Puerto Rico, which has the world's largest radio-radar telescope.

Cornell University has come to be a place of learning whose scholars and students have reached out into every aspect of human affairs, into all forms of study relating to our planet, and to the limits of the universe as man knows them. Behind this achievement lies more than a century of steady, solid growth, the enterprise of hundreds of thousands of students, the dedication of thousands of professors, the skill of administrators, the wisdom of trustees.

The vast range of knowledge and experience assembled at Cornell gives to student and professor a sense of security. The security comes from being heir to a century of Cornell's history, and of having available in libraries and art galleries and concert halls the words of wise men and the creations of artists. And more than security. To the student, what could be more stimulating than to know that he or she has joined a community that affords infinite opportunity for study, for new friendships, and for association with persons dedicated to the pursuit of knowledge?

Frederick G. Marcham  
Goldwin Smith Professor of English History emeritus

## The Students

Cornell University has a student body of about 16,000 in the eleven schools and colleges at Ithaca. More than 28 percent of the students are engaged in graduate and professional study. The student body is diverse in interests and background, with 53 percent of the undergraduates from New York State, 43 percent from the remaining fifty states, and 4 percent from over ninety foreign countries.

### Regional Origin of Students

New England	1,699
New York State	8,069
Mid-Atlantic	2,619
Southeast	485
Midwest	1,126
Southwest/Mountain	323
Far west	671
Foreign and United States possessions	1,080
Total	16,072*

\*Figures are for fall 1982 and do not include extramural students, students registered in absentia, or students in the New York City divisions.

## Retention and Graduation of Undergraduates

By fall 1982, 84.3 percent of the students that entered endowed undergraduate units in fall 1976 (Architecture, Art, and Planning; Arts and Sciences; Engineering; and Hotel Administration) had either graduated or were still enrolled. In the statutory units (Agriculture and Life Sciences; Human Ecology; and Industrial and Labor Relations) 91.4 percent had graduated or were still working toward a Cornell degree.

It is the policy of Cornell University actively to support equality of educational and employment opportunity. No person shall be denied admission to any educational program or activity or be denied employment on the basis of any legally prohibited discrimination involving, but not limited to, such factors as race, color, creed, religion, national or ethnic origin, sex, age, or handicap. The University is committed to the maintenance of affirmative action programs which will assure the continuation of such equality of opportunity.

Cornell University is committed to assisting those handicapped students who have special needs. A brochure describing services for the handicapped student may be obtained by writing to the Office of Equal Opportunity, Cornell University, 217 Day Hall, Ithaca, New York 14853. Other questions or requests for special assistance may also be directed to that office.



## University Resources

Students benefit from a wide variety of resources, both human and physical, that contribute significantly to their Cornell education. The following sections provide an idea of some of the more intriguing and stimulating possibilities.

## University Libraries

The Cornell University Libraries are rated as one of the major academic library systems in the United States. The sixteen campus libraries contain well over four million volumes and currently subscribe to fifty-two thousand periodicals. These libraries provide the facilities for research and study in hundreds of undergraduate major subject areas and in over eighty-five fields of study for advanced degrees.

All students at Cornell are entitled to use any of the libraries on campus, although access to the stacks may be limited in some cases. Students are particularly encouraged to participate in the orientation sessions and tours offered by the libraries. All libraries are open long hours, some until midnight, and schedules and tour information are available at every library.

At the south end of the Arts Quadrangle is Uris Library, the building with the tower that has become the symbol of Cornell. Uris is essentially an undergraduate library for students in the liberal arts. A principal aim of this library is to bring readers and books as close together as possible. Accordingly, the stacks, containing more than 129,000 volumes, are open to all, and only reserve books in heavy demand are held in a special category. There are listening rooms where students, singly or in groups, may hear recordings of the spoken word, and there is a lecture room with sound and projection capabilities.

Across the walk from Uris is the John M. Olin Library, devoted more specifically to graduate and faculty research. This closed-stack library houses many special collections of books and manuscripts, among them rare books, a collection on East and Southeast Asia, an Icelandic collection, History of Science collections, the archives of the University, maps, and newspapers.

The two libraries, Uris and Olin, complement each other in support of the University's program of teaching and scholarship. In addition to these facilities, there is an extensive system of college and school libraries. Chief among them is the Albert R. Mann Library, serving the New York State Colleges of Agriculture and Life Sciences, and Human Ecology. Located at the east end of the Agriculture Quadrangle, Mann Library's open stacks hold half a million volumes, including the research library of the Division of Biological Sciences.

Other college libraries include the Fine Arts Library, serving the College of Architecture, Art, and Planning; the libraries of the College of Engineering and the New York State College of Veterinary Medicine; and the libraries serving the Graduate School of Business and Public Administration, the Law School, the School of Hotel Administration, and the New York State School of Industrial and Labor Relations. In addition, there are many large department libraries on the campus. For more specific information, see *Libraries at Cornell*, available at all libraries.

Many of the libraries have special copying services, audiovisual facilities, bibliographic retrieval services, study rooms, microfilm and microfiche readers, typewriters, and interlibrary loan services, and some publish handbooks and bibliographies that are distributed without charge. The library issues directories of locations by subject, hours, and services that are available in all the libraries.

Orientation sessions on how to use the library are offered at the beginning of each semester by the larger campus libraries. Schedules for vacation periods, intersession, and summer session are always posted or available at the separate libraries.

## Museums and Art Exhibitions

**The Herbert F. Johnson Museum of Art**, designed by world-renowned architect I.M. Pei, complements the architecture and vistas of the more traditionally styled campus. Its sweeping views give visitors and residents alike a new perspective on the beauty of Cayuga Lake.

The museum's collections are particularly strong in Asian art, nineteenth- and twentieth-century painting, and the graphic arts. Located on Central Avenue, the museum is open daily Tuesday through Sunday, 10:00 a.m. to 5:00 p.m.

The museum has an active membership program, and members' contributions are the main source of funds for acquiring works of art. Anyone interested in becoming a member may inquire at the reception desk or call 256-6464.

**Art exhibitions.** Cornell is generously supplied with art exhibitions, some permanent and some temporary. The displays range from the works of students and visiting collections to the permanent University collection housed at the Herbert F. Johnson Museum of Art. Other campus locations for art displays include the Art Room in the Straight, the John Hartell Gallery in Sibley Hall, and the galleries in Goldwin Smith Hall, Martha Van Rensselaer Hall, and Tjaden Hall.

## Music

Students who want to participate in music making will find a wide range of opportunity through the Sage Chapel Choir, the Cornell Chorus, the University Glee Club, the University orchestras and bands, chamber music ensembles, the Opera Workshop, the Collegium Musicum, and the Indonesian Gamelan. The Cornell chimes, housed in McGraw Tower, are rung by students.

The University Faculty Committee on Music sponsors programs by visiting soloists and major orchestras in the Bailey Hall Concert Series, string quartets and other groups in the Statler Series at Alice Statler Auditorium, and occasional operas, ballets, and special events. Several times each month the Department of Music sponsors free concerts and lectures by visiting artists or by Cornell faculty and students, primarily in Barnes Hall Auditorium.

The Cornell Concert Commission offers a series of student-produced popular rock, folk, soul, and jazz concerts. Other student organizations have regular performances of Gilbert and Sullivan operettas, jazz, and folk music. Local bluegrass and folk performers are featured in informal concerts in the Commons, a coffeehouse in Anabel Taylor Hall.

## Astronomy

Cornell operates two local optical observatories, the Fuertes Observatory (near the North Campus dormitory area) and the Hartung Boothroyd Observatory, and the world's largest radio-radar telescope, in Arecibo, Puerto Rico.

The Spacecraft Planetary Imaging Facility, a joint undertaking of NASA's Planetary Geology Program and the University, serves as a focus for planetary studies at Cornell and is one of seven such facilities in the United States. The facility contains a comprehensive collection of thousands of images

obtained by United States planetary and lunar spacecraft, as well as related cartographic and support data.

## Theater

Cornell students have numerous opportunities to attend or participate in theatrical productions.

Under the sponsorship and general supervision of the Department of Theatre Arts, Theatre Cornell presents a full season of classical, modern, and experimental dramas. These productions include guest professionals, graduate actors, designers, and directors from the department's professional training program as well as undergraduate majors. All students in the University who are interested in participating in theater in any capacity are eligible to audition for these productions. Auditions are held twice a year. The department also has, in its studio theater, a more informal production program, directed, acted, designed, and managed entirely by students. Staffing and casting for these events take place throughout the year.

Other theatrical opportunities can be found at Risley Residential College, which has a small theater available for student productions; with the Cornell Savoyards, who produce two Gilbert and Sullivan operettas annually; and within the Ithaca community, which has several theater groups that mount various productions during the year.

## Dance

The dance division of the Department of Theatre Arts sponsors a range of possibilities for students interested in dance. Informal and formal dance programs are presented through the year by student dancers and choreographers. In the spring, a dance concert presents works by guest, faculty, and student choreographers. The division also sponsors a series of performances by touring professional dance companies during the year. The Ithaca community includes several studios that present workshops and performances in a wide range of dance forms.

Students interested in social and ethnic dance will find that dancing is a popular activity. Student organizations sponsor folk, contra, and square dances frequently. Most dances are taught at these events, and beginners are welcome. The Department of Physical Education and Athletics usually offers a course in folk or square dancing each semester.

## Lectures

On the more academic side of audience entertainment, there is the lecture. Dozens of extracurricular lectures are given every week, ranging from scholarly presentations on subjects of narrow interest to lectures by well-known speakers with campus-wide appeal.

## Films

Throughout the year and on almost every night of the week, single film showings and film series make available educational and entertaining films at reduced rates. In addition, there are a half-dozen commercial theaters in Ithaca itself, making movie going among the most popular leisure-time activities.

Students interested in producing their own films may participate in the filmmaking program sponsored by the Department of Theatre Arts.

## Publications

Cornell students edit and publish a wide variety of publications, including a yearbook, literary magazines, and a number of magazines relating to special fields of interest, such as the *Cornell Engineer*, *Praxis Magazine*, *Rainy Day*, the *Cornell Countryman*, and the *Cornell Law Review*. Cornell students are in complete charge of the publication of the *Cornell Daily Sun*, an independent daily newspaper.

## Special Facilities for Research

Facilities for research at Cornell offer faculty members and students a range of opportunities. The unique or specialized facilities are highlighted below.

### Agricultural and Biological Sciences

Bradfield Hall houses computers, radar, and other specialized equipment used in making up-to-the-minute weather forecasts. The insect collection in Comstock Hall contains more than four million specimens, making it one of the largest university insect collections anywhere. Liberty Hyde Bailey Hortorium is the world's leading center for the study of palms, a plant family second only to grasses in economic importance. The Department of Food Science operates a full-scale dairy plant and a salesroom.

The new Corson and Mudd Buildings, a complex for biological sciences, houses many different controlled environments: cold rooms; chambers controllable for constant light, humidity, and temperature; aviaries; aquarium rooms; rooms for electron microscopy; and anechoic chambers, among other facilities.

The Boyce Thompson Institute for Plant Research, housed in facilities on Tower Road, gives the University the largest concentration of plant scientists in the world.

Near the campus are a 180-acre, University-maintained bird sanctuary, Sapsucker woods; and the University Plantations, which has trails through natural areas and special collections, including peonies, rhododendrons, nut trees, an herb garden, a wildflower garden, and seasonal plantings.

The Animal Science Teaching and Research Center was established in 1973 on twenty-five hundred acres of fertile valley and hillside land near Dryden, about fifteen miles from campus. It now houses some 850 head of dairy cattle, 450 beef cattle, and 900 sheep. About one thousand acres of corn and grasses are planted and harvested each year.

The orchard laboratory conducts research on fruit crops; the popular salesroom may be reached by campus bus.

Renowned off-campus facilities include an agricultural experiment station in Geneva, New York, and the Shoals Marine Laboratory, a marine biology laboratory off the coast of Maine.

### Engineering and Physical Sciences

The National Research and Resource Facility for Submicron Structures is the newest research facility on campus. It is expected to have a profound effect on the communications industry. The University operates a synchrotron radiation laboratory in conjunction with a high-energy storage ring. The Laboratory for Plasma Studies provides a center for research in plasma physics and lasers. The Materials Science Center is equipped with highly sophisticated equipment for interdisciplinary research. The Ward Laboratory for Nuclear Engineering is the site of interdisciplinary research involving irradiation, isotope production, and activation analysis.

The University has two computer graphics facilities, one for instruction and one for research.

The world's largest radio-radar telescope, in the National Astronomy and Ionosphere Center, in Puerto Rico, is operated by the University.

### Social Sciences

The Eleanor J. Gibson Laboratory of Developmental Psychology explores the development of perception in infants. Research in infant language acquisition is carried out in Martha Van Rensselaer Hall. Uris Hall houses the Human Experimental Laboratory (of the Department of Psychology), a biopsychology laboratory, and a social psychology laboratory.

## Computer Services

At Cornell, computers are used by musicologists, archaeologists, historians, engineers, architects, writers, linguists, accountants, doctors, scientists, students, and faculty in every discipline. Cornell Computer Services (CCS) supplies and maintains computer hardware, operating systems, and general and specialized programs to meet a broad spectrum of user needs. To make these resources readily accessible, CCS operates public terminals and microcomputers, provides some free consulting services, produces informative documentation, and offers or cosponsors a variety of user education programs.

Cornell's main computers consist of large-scale IBM computers with attached array processors, a VAX 750, and a DECSYSTEM 2060. Public terminal facilities are located in seven different areas on campus. They house more than 165 workstations, including 50 Terak microcomputers used for introductory programming courses. Freshman writing courses are now using nine IBM Displaywriters in a new word processing center in Goldwin Smith Hall. A public computer graphics area is located in Uris Hall. Cornell added a second Floating Point Systems attached array processor to its computing system in 1982. These specialized computers are very fast and highly cost effective for long calculations.

Cornell is attached to Telenet and TYMNET, which allow the central Cornell computers to be accessed by a local phone call from forty states, Mexico, Canada, and Europe. As a member-supplier of EDUNET, Cornell shares computer resources with other universities, colleges, and nonprofit groups associated with higher education and research. Cornell is also a member of BITNET and MAILNET, providing two-way "electronic mail" service between Cornell and other universities.

## Degree Programs

### Undergraduate Degrees

The undergraduate curricula at Cornell University lead to the Bachelor of Arts (A.B.) degree in the College of Arts and Sciences. The Bachelor of Science (B.S.) degree is offered by the College of Agriculture and Life Sciences, the College of Human Ecology, the School of Hotel Administration, the College of Engineering, and the School of Industrial and Labor Relations. The College of Architecture, Art, and Planning offers the Bachelor of Architecture (B.Arch.), the Bachelor of Fine Arts (B.F.A.), and the Bachelor of Science (B.S.) degrees.

### Graduate Degrees

The graduate program at Cornell, with its emphasis on flexibility and independence, permits an unusual degree of accommodation to the needs and interests of the individual student. Most graduate degrees are offered through the Graduate School. Professional graduate degrees are offered through the professional schools and colleges. More information on the graduate degrees offered by Cornell may be found in the section on the Graduate School of Business and Public Administration, the Graduate School, the Law School, and the New York State College of Veterinary Medicine.

## Division of Unclassified Students

The Division of Unclassified Students (DUS) assists Cornell undergraduates in transferring between colleges of the University when direct internal transfer is not possible. The division also serves as a counseling agency for students whose academic and career goals have changed. Such students are advised about alternatives within the Cornell system.

To apply to the division, students must

- 1) Make an appointment for an interview in DUS. Telephone: 256-4386.
- 2) Complete the DUS application form and return it to the division office, 158 Olin Hall.
- 3) Submit Application for Transfer coupons to the Office of the University Registrar, 222 Day Hall, requesting transfer to DUS.

Candidates are admitted to the division when, in the judgment of the DUS Administrative Committee, there is reasonable evidence that a transfer can be accomplished and that the proposed program is consistent with the student's stated objectives. Students are admitted for one semester but may be allowed to continue in the division for a second term if that is necessary and the student is making progress toward transfer.

## 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 Graduate School of Business and Public Administration 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.

Business management and marketing, agricultural economics, farm-business management and finance, food-industry management, and resource economics are examples of specific areas available. There is more emphasis on the application of these areas than on the theoretical aspects of economic theory and money, currency, and banking. (These subjects would be more easily pursued in the Department of Economics.) Instruction is appropriate for both agricultural and nonagricultural use.

**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.

Study in operations research and industrial engineering is particularly appropriate for those anticipating a business management career. The curriculum focuses on the design of integrated, cost-effective systems of people, materials, and equipment for manufacturing industries, public and private service organizations, and consulting firms.

**Hotel administration.** This undergraduate program provides managers for the hospitality industry. Capability for management of motels, hotels, condominiums, restaurants, clubs, hospitals, and land and facility development is developed through instruction in personnel and general administration, financial management, food and beverage service, and communications. Students interested in the School of Hotel Administration must have developed

an explicit awareness of and commitment to this area through work experience, reading, study, and discussions with industry representatives.

**Consumer economics and housing.** The focus is on the economic behavior and welfare of consumers in the private, public, and mixed sectors of the economy. There is an option for special concentration on housing. Study aims at an understanding of economics, sociology, and government policy as they apply to consumer problems.

**Industrial and labor relations.** The world of work, especially the employee-employer relationship in the broadest sense, including the political, social, and economic forces affecting that relationship, is studied. Graduates can pursue immediate employment in industry, government, and labor organizations or choose graduate study in industrial and labor relations or such related fields as law and business and public administration.

### 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 Graduate School of Business and Public Administration, 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 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.

### 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 and no undergraduate course of study that is totally inappropriate. Prelaw students should, however, be guided by certain principles 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. Courses in the Freshman Seminar Program, required of nearly all Cornell freshmen, are



designed to develop these skills. English literature and composition, and communication arts 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 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 tasks 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 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.

## 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 Seminar course). 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, most successful Cornell applicants to medical and dental schools have been enrolled primarily in the Colleges of Arts and Sciences, and Agriculture and Life Sciences, with some also in the Colleges of Engineering and Human Ecology. 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 these programs is available from the Health Careers Program office at the Career Center, Cornell University, 203 Barnes Hall, Ithaca, New York 14853.

## Preveterinary Study

There is no specific preveterinary program at Cornell, and students interested in veterinary medicine as a career should select an area for study that fits their interests while at the same time meeting the entrance requirements for veterinary college listed below. Most preveterinary students enroll in the College of Agriculture and Life Sciences. However, because of the statutory nature of that college, out-of-state applicants will find it extremely difficult to gain acceptance into its biological sciences or animal sciences program. These and other students, because of their secondary interests or desire for a broader undergraduate curriculum, often enter other divisions of the University, especially the College of Arts and Sciences.

The college-level prerequisite courses for admission to the New York State College of Veterinary Medicine at Cornell are English, biology or zoology, physics, inorganic chemistry, organic chemistry, biochemistry, and microbiology. All science courses must include a laboratory. The college also requires demonstrated proficiency in written and spoken English and encourages college-level work in mathematics. These requirements, necessary for admission to the New York State College of Veterinary Medicine at Cornell, may vary slightly at other veterinary colleges.

For information on additional preparation, including work experience and necessary examinations, students should consult the brochure *Admission to the New York State College of Veterinary Medicine*, obtained by writing to the Office of Admissions, New York State College of Veterinary Medicine, Cornell University, C117 Schurman Hall, Ithaca, New York 14853.

## Interdisciplinary Centers and Programs

### Africana Studies and Research Center

For information about the programs and courses offered by the center, see pages 199–202.

#### Faculty Roster

Cross, William E., Ph.D., Princeton U. Assoc. Prof., Africana Studies and Research Center  
Graves, Anne Adams, Ph.D., U. of Michigan, Ann Arbor. Asst. Prof., Africana Studies and Research Center  
Harris, Robert L., Ph.D., Northwestern U. Assoc. Prof., Africana Studies and Research Center  
Mbata, J. Congress, U.E.D., U. of South Africa. Assoc. Prof., Africana Studies and Research Center  
Turner, James E., Ph.D., Union Grad. Sch. at Antioch Coll. Assoc. Prof., Africana Studies and Research Center

### Center for International Studies

M. J. Esman, director

The Center for International Studies, 170 Uris Hall, supports and coordinates Cornell's programs of international and comparative studies. By serving as a focal point for ideas, information, and advice about the University's wide range of international offerings, the center contributes to their further development. The center places particular emphasis on strengthening inquiry into issues that cut across disciplinary, professional, and regional concerns, and on providing a continuing source of innovation and experimentation in international studies. The center and its constituent programs promote interdisciplinary teaching and research in international and comparative studies. These programs are:

#### Area Programs

International Ethnicity Committee (170 Uris Hall)  
China-Japan Program (140 Uris Hall)  
Committee on Soviet Studies (180 Uris Hall)  
Latin American Studies Program (190 Uris Hall)

South Asia Program (170 Uris Hall)  
Southeast Asia Program (120 Uris Hall)

#### Problem-Oriented Programs

International Political Economy Program (170 Uris Hall)  
International Population Program (372 Uris Hall)  
Participation and Labor-Managed Systems (490 Uris Hall)  
Peace Studies Program (180 Uris Hall)  
Rural Development Committee (170C Uris Hall)  
Western Societies Program (166 Uris Hall)

#### Professional School Programs

International Agriculture (261 Roberts Hall)  
International Business and Public Administration (526 Malott Hall)  
International and Comparative Labor Relations (296 Ives Hall)  
International Education Program (NG09 Martha Van Rensselaer Hall)  
International Hotel Management (335A Statler Hall)  
International Legal Studies (309 Myron Taylor Hall)  
Program on International Nutrition and Development Policy (114A Savage Hall)  
International Studies and Planning (200 West Sibley Hall)

## Cornell-in-Washington Program

Cornell-in-Washington is a program of instruction, research, and internships in the nation's capital. The program is open to qualified juniors, seniors, and graduate students from all colleges, schools, and divisions of the University. Full academic credit can be earned for the semester. Most students enroll in the seminar-internship course, Projects in Public Policy (Government 500), which involves a major research study carried out through an internship. 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. In addition, special programs are offered in architecture, industrial and labor relations, and communication arts. All seminars are taught by Cornell faculty and carry appropriate credit towards fulfillment of major, distribution, and other academic requirements.

Housing accommodations can be arranged for all interested participants. Fully furnished apartments are available in a newly renovated, centrally located apartment complex.

Further information concerning internships, courses, and other features of the program may be obtained from the Cornell-in-Washington office at 134 McGraw Hall (telephone: 256-4090).

## Program on Science, Technology, and Society

Dr. Walter R. Lynn, director, 632A Clark Hall, 256-3810

The Program on Science, Technology, and Society (STS) is an academic unit that engages in teaching and research involving the interactions of science and technology with social and political institutions. In collaboration with other University departments and centers, the STS program participates in the development of interdisciplinary courses at both the graduate and undergraduate level. These courses are designed to synthesize the perspectives of several academic disciplines in the analysis of relationships between science and technology on one hand, and today's society on the other. Current course and research topics include science, technology, and public policy; biology and society; technology assessment; arms control and national defense policies; energy policy; environmental policy and ethics; health and safety regulation; biomedical ethics; science policy; science and technology for development; scientific and technological literacy; and citizen participation in technical decision making. The program draws its students, faculty, and research staff from the various divisions of the University.

### Biology and Society Major

Developed initially by STS, 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.

### Graduate Studies

STS does not enroll students for advanced degrees. Rather, the program cooperates with departments in the various colleges to facilitate curriculum development and research interests on the interrelations of science, technology, and social policy. Faculty members affiliated with the STS program are also members of graduate fields of

study such as anthropology, city and regional planning, ecology, the various engineering fields, government, philosophy, sociology, and toxicology. It is possible to undertake research and course work in the area of science, technology, and society within one of the aforementioned fields, as well as others. A minor concentration in science and technology policy is available within the graduate minor field of public policy, and in the Master of Professional Studies (International Development) degree. Further information about these graduate programs may be obtained by contacting the Graduate School.

### Courses

STS courses are cosponsored by the University academic departments. The titles and numbers of these courses are listed below; for course content and other details, refer to the listings of the particular cosponsoring department. Further information concerning the program, including a list of STS-related courses offered throughout the University and information concerning individualized courses of study, may be obtained from the program office, 632 Clark Hall (telephone: 256-3810).

Biomedical Ethics (Biological Sciences 205 and Philosophy 245)  
The Politics of Technical Decisions (Sociology 670, City and Regional Planning 541, Government 628, and Business and Public Administration NPA 515, 2 semesters)  
Social Implications of Technology (Civil and Environmental Engineering 325)  
Environmental Law (Civil and Environmental Engineering 626)  
Urban Affairs Laboratory (Government 312)  
Science, Technology, and Law (Law 780)  
International Politics of Energy (Government 490)  
History of Biology (History 287 and Biological Sciences 201)  
Environmental Ethics (Biological Sciences 206 and Philosophy 246)  
Urban Affairs Laboratory (Government 312)  
Science and Human Nature (Philosophy 286)  
Technology, Society, and the Human Condition (Mechanical and Aerospace Engineering 302)  
Seminar in Technology Assessment (Civil and Environmental Engineering 426 and College Scholar 464)  
Social and Political Studies of Science (Sociology 355 and City and Regional Planning 442)  
Science, Technology, and Human Needs (Design and Environmental Analyses 232)  
History of Biology (History 288 and Biological Sciences 202)  
The Population Biology of Health and Disease (Veterinary Medicine 330)  
Biology and Society I: The Biocultural Perspective (Anthropology 301 and Biology and Society 301)  
Biology and Society Senior Seminars (Biology and Society 400-408)  
Issues in Biology and Society: Chemicals, Enzymes, and Maladies (Biology and Society 310)  
Scientists and Political Revolutions (Society for the Humanities 415)  
Alternative Food Production Systems (Biological Sciences 302 and Biology and Society 302)  
Science and Human Nature (Philosophy 286)  
Scientists and Political Revolutions (Society for the Humanities 416)  
Standards and the Quality of Life (Design and Environmental Analysis 648)  
The Population Biology of Health and Disease (Veterinary Medicine 330)  
Transportation Economics (Civil and Environmental Engineering 666)  
War and Peace in the Nuclear Age (Government 384 and Physics 206)  
Rhetoric and Technology (Comparative Literature 315)  
Biological Basis of Sex Differences (Biology and Society 214, Women's Studies 214, and Biological Sciences 214)  
History of Biology (Biology and Society 287, History 287, and Biological Sciences 201)

Issues in Biology and Society: Professional Ethics (Biology and Society 311)  
Issues in Biology and Society: The Anthropology of Medicine (Biology and Society 312 and Anthropology 312)  
Human Growth and Development (Biology and Society 347 and Human Development and Family Studies 347)  
Independent Study (Biology and Society 375)

## Program in Comparative and Environmental Toxicology

C. F. Wilkinson, director, N202 Martha Van Rensselaer Hall, 256-8112 or 256-8113

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 in many University departments.

### Graduate Studies

The major 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 biochemical, genetic, nutritional, and veterinary toxicology; ecotoxicology; and policy issues associated with the use, risk management, and regulation of toxic substances. 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 man) 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 ICET office, N202 Martha Van Rensselaer Hall (telephone: 256-8112).

Tox 304 Chemicals, Enzymes, and Maladies (Biological Sciences 304 and Biology and Society 310)  
Tox 370 Pesticides in the Environment (Entomology 370)  
Tox 418 Mutagenesis and Genetic Toxicology (Animal Science 418)  
Tox 419 Animal Cytogenetics (Animal Science 419)  
Tox 438 Cell Proliferation and Oncogenic Viruses (Biological Sciences 438)  
Tox 443 Managing the Aquatic Environment (Natural Resources 443)  
Tox 528 Pharmacology (Veterinary Medicine 528)  
Tox 605 Ecology and Management of Disturbed Aquatic Systems (Natural Resources 605)  
Tox 609 Effects of Ecological Perturbations on Fishes (Natural Resources 609)  
Tox 610 Introductory Chemical Toxicology (Food Science 610)  
Tox 611 Molecular Toxicology (Nutritional Sciences 611)

Tox 615 Environmental Law (Civil and Environmental Engineering 615)  
 Tox 621 Toxicology (Veterinary Medicine 621)  
 Tox 627 Regulation of Toxic Substances (Civil and Environmental Engineering 627)  
 Tox 640 Principles of Toxicology Pathology (Veterinary Medicine 640)  
 Tox 651 Nutrition and the Chemical Environment (Nutritional Sciences 651)  
 Tox 660 Safety Evaluation in Public Health (Veterinary Medicine 660)  
 Tox 690 Insect Toxicology and Insecticidal Chemistry (Entomology 690)  
 Tox 702 Seminar in Environmental and Nutritional Toxicology (Nutritional Sciences 702)  
 Tox 751 Dilemmas for Toxicologists (and Other Scientists) (Biological Sciences 751)  
 Tox 699 Current Topics in Environmental Toxicology (ID 699)

## Advanced Placement of Freshmen

The appropriate department of instruction sets the standards of achievement that must be met for advanced placement at Cornell and *recommends* AP credit for those who meet the standards. This recommendation is almost always based on some examination score. The student's college decides whether to *award* the credit. 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 and the College-Level Examination Program (CLEP) of the College Entrance Examination Board, and the United States Armed Forces Institute are considered. Entering freshmen should have their scores sent to their college or school office (see 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, CEEB College-Level Examination Program tests, or departmental examinations are shown below.

**Transfer of credit.** Entering freshmen who have completed college courses for which they wish to receive credit toward their Cornell degree should send transcripts and course descriptions to their college or school office (see 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 Assistant Director of International Admissions, Cornell University, 410 Thurston Avenue, Ithaca, New York 14850, U.S.A. Students holding foreign credentials who feel they may be eligible for advanced standing consideration should contact the International Student Office prior to 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.

## 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 or on the special departmental examination, as follows.

Any student who earns a score of 5 on either of these examinations 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 Arts and Sciences and the College of Human Ecology, and a portion of the Group B distribution requirement for students in the College of Agriculture and Life Sciences.

Biological sciences majors and others expecting to take advanced biology courses who receive a score of 4 must fulfill the introductory biology requirement by taking Biological Sciences 103–104. These students will receive a total of eight introductory biology credits (four advanced placement credits plus four course credits).

Students with strong preparation in biology may take the departmentally administered examination by arranging *in advance* with the General Biology Office, Cornell University, 310 Roberts Hall. This examination is given only once annually, during Orientation Week. A sheet describing the examination content and format, eligibility, fee, and credit is available by writing to that office.

## 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 3 or 4 on the CEEB examination qualifies the student for 4 credits; a score of 5 on the CEEB examination entitles the student to 8 credits. A student may also earn four or eight credits by suitable performance on the departmental examination. Before taking the special departmental examination, students should consult Dr. Stanley Marcus, in 150 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 Professor Barbara Baird.

## Classics

For advanced placement and credit in Latin and Greek, students should consult the Department of Classics, Cornell University, 120A Goldwin Smith Hall. Advanced placement and credit are determined as outlined below.



**Latin.** Students may be tentatively placed in a 300-level Latin course if they achieve a score of 4 or 5 on the CEEB Advanced Placement Examination, but they must also take the department's own placement examination during orientation week. A student who is permitted to register in a 300-level course will be given six advanced placement credits.

**Greek.** For information concerning advanced placement, consult the chairman of the Department of Classics.

## Computer Science

Beginning in fall 1983, Cornell will offer advanced placement in computing. However, because of the variety of different programming languages, this cannot easily be accomplished with an examination. Instead, a special version of the regular introductory programming course will be offered during the first five weeks of the term. This introduces students to the programming language (PL/1) and the programming system used at Cornell and provides a review of the key ideas in programming. Students who complete this course satisfactorily (with a grade of B- or better) receive four credits for the full-term introductory programming course (Computer Science 100).

A student who starts out in this advanced placement programming course can at any time, without penalty, switch to the regular introductory course.

The Department of Computer Science has just introduced this option, and the various colleges have not yet decided whether to allow their students to participate. More information will be available at a later date.

## Economics

The Department of Economics will grant up to six advanced placement credits to a student who scores 600 or higher in the College-Level Examination Program test in introductory economics. Such a student will be admitted to courses for which Economics 101 and 102 are prerequisites.

For further information, write to the Department of Economics, Cornell University, 416 Uris Hall.

## English

For exceptionally well qualified freshmen the Department of English will recommend three or six advanced placement credits, and freshmen for whom such credit has been recommended will also be eligible to enroll in English 270, 271, or 272.

The department will consider awarding advanced placement credit to freshmen who receive scores of 750 or above on the CEEB College Placement Test (CPT; formerly CEEB Achievement Test) in English composition, 710 or above on the CEEB College Placement Test in literature, or 5 on the CEEB Advanced Placement Examination. Students who seek advanced placement credit are encouraged to take as many of these tests as possible.

Students who receive scores of 700 to 749 on the CEEB College Placement Test in English composition, 700 to 709 on the CEEB College Placement Test in literature, or 4 on the CEEB Advanced Placement Examination will be eligible to take an advanced standing examination offered by the department during orientation week. These students, too, are eligible to take English 270, 271, or 272. This examination will be an important factor in awarding advanced placement credit. The department will also consider secondary school grades in determining whether credit will be awarded.

Advanced placement credit awarded in English may not be used to satisfy the humanities or expressive arts requirement of the College of Arts and Sciences.

If space permits, freshmen whose secondary school records indicate they are qualified may enroll in English 270, 271, or 272 during their first semester.

## German Literature

The Department of German Literature 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.

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 review examination papers of students with scores of 4 or 5 on the CEEB Advanced Placement Examination. Students may be eligible to register for 300-level courses in the Department of History of Art and may also receive three credits. Questions concerning advanced placement may be directed to the department chairman, Cornell University, 35 Goldwin Smith Hall.

## Mathematics

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

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.

Students with a grade of 4 or 5 on the BC examination may take the appropriate third-semester course (Mathematics 293 or 221) or the sequence 214-215-216-218, 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 192, 122, or 112). Students with a 2 on the BC examination or a 3 on the AB examination may take one of the second-semester courses (Mathematics 192 or 112). 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.

Students entering the upper sequence who have a firm grounding in the first semester of calculus but cannot omit the second may, with the consent of the Department of Mathematics, take Mathematics 122 and 221 simultaneously in their first semester. Thus students who take Mathematics 222 in the second semester may have completed the sophomore course by the end of their first year.

## 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 College Placement Test (CPT). Language course placement is made using guidelines that match CPT reading scores with various levels of courses. In cases where no CPT 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 CPT are permitted to take the examination again during orientation week.

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

- 1) For high school work, three to eight credits may be granted for the equivalent of 200-level courses. Credit is based on performance on the CEEB Advanced Placement Examination, Cornell's Advanced Standing Examination, or a special departmental examination. To be eligible for Cornell's Advanced Standing Examination, students must have earned a score of 650 or above on the reading section of the College Placement Test (CPT). A student who has received three credits by scoring 4 or 5 on the CEEB Advanced Placement Examination is advised to take the Cornell Advanced Standing Examination. 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 upon submission of a transcript and may be entered on the student's Cornell record.
- 3) Native speakers of languages other than English may, upon 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

### Advanced Placement Program (CEEB) Examinations Summary of Credit and Placement

Subject	Score	Advanced Placement Credit	Placement
Arabic	Department determines credit and placement based on departmental examination.		
Biology	5 (majors)	8 credits	Placement out of all introductory courses.
	5 (nonmajors)	8 credits	Satisfies the introductory biological sciences distribution requirement.
	4 (majors*)	4 credits	4 AP credits awarded after completion of 103–104.
	4 (nonmajors)	6 credits	Placement out of 109–110. Satisfies the biological sciences distribution requirement but does not always satisfy the prerequisite for second- and third-level courses in biology.
Chemistry	5	8 credits	Department determines placement.
	3,4	4 credits	Department determines placement.
Computer Science	4 credits upon successful completion of Computer Science 100 for students with previous experience.		
Economics	Department determines credit and placement.		
English	Department uses additional measures. Qualified students are notified.		
French language	4,5	3 credits	Department determines placement. Students may earn additional credit by taking CASE examination.†
French literature	4,5	3 credits (and proficiency)	Department determines placement. Students may earn additional credit by taking departmental examination.
German language	4,5	3 credits	Department determines placement. Students may earn additional credit by taking CASE examination.†
German literature	5	3 credits (and proficiency)	Department determines placement.
	4	3 credits	Department determines placement.
Greek	4,5	Department determines credit and placement based on departmental examination.	
Hebrew	Department determines credit and placement based on departmental examination.		
American history	4,5	4 credits	
European history	4,5	4 credits	
History of art	4,5	Department determines credit and placement.	
Italian literature	4,5	3 credits (and proficiency)	Department determines placement. Students may earn additional credit by taking departmental examination.
Latin	4,5	Department determines credit and placement based on departmental examination.	
Mathematics BC	4,5	8 credits	Placement out of 111, 112. Permission to take 221 or 293 or 214–215–216–218.
	3	4 credits	Placement out of 111. Permission to take 112, 122, or 192.
	2	4 credits	Placement out of 111. No advanced placement credit for students who take 111. Permission to take 112 or 192.
Mathematics AB	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	5		
	4,5	4 credits in physics	Student may choose placement out of Physics 112 or 207 instead of 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	Placement out of Physics 112 or 207.
Physics C—Electricity and Magnetism	5	Choice of acceptance of 4 credits for Physics 208 (or 213) or placement into Physics 217 with no AP credit. See department representative.	
	4	Choice of acceptance of 4 credits for Physics 208 or placement into Physics 217 with no AP credit. See department representative.	
Psychology	Department determines credit and placement.		
Sociology	Department determines credit and placement.		
Spanish language	4,5	3 credits	Department determines placement. Students may earn additional credit by taking CASE examination.†
Spanish literature	4,5	3 credits (and proficiency)	Department determines placement. Students may earn additional credit by taking 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.

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the Department of Modern Languages and Linguistics. Students must register for these tests at Academic and Career Counseling Services, 203 Barnes Hall, and pay a fee. 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 S. Stucky. Inquiries may be directed to the Department of Music, Cornell University, 124 Lincoln Hall (telephone: 607/256-4097).

### Near Eastern Studies

For advanced placement and credit in Hebrew and Arabic, students should consult the Department of Near Eastern Studies, Cornell University, 388 Rockefeller Hall. 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 permission to take the departmental examination, students should consult Professor R. Cotts, 522 Clark Hall. Results of the CEEB Advanced Placement Examination are reviewed individually by the Department of Physics, using the guidelines discussed below.

**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.** To receive credit in calculus-based physics courses, a student should be eligible for advanced placement or transfer credit in one semester of the mathematics calculus sequence for each physics course credited.

- 1) **C—Mechanics** Students earning a score of 4 or 5 may receive four credits for Physics 112 or 207.
- 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 should 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 have scored well on the CEEB College-Level Examination Program psychology test may receive advanced placement credit in psychology. Those interested in taking further courses in psychology should consult a faculty member in the Department of Psychology, Cornell University, 214 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 and Spanish Literature)

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

For information about the College Placement Test, see "Modern Languages," p. 12.

### Sociology

The Department of Sociology will recommend three advanced placement credits for students who receive the equivalent of a B on the CEEB College-Level Examination Program sociology test and whose essays are considered acceptable by the department. Students receiving this credit will be eligible for placement into courses for which an introductory course in sociology is the prerequisite.

For further information, contact the Department of Sociology, Cornell University, 323 Uris Hall.

### College of Arts and Sciences Regulations

**Courses taken at other colleges** before matriculation at Cornell may count toward the degree if the appropriate department approves. Such credit is counted as part of the 120 credits required for the degree, but not as part of the 100 credits required in College of Arts and Sciences courses unless the department concerned accepts such courses as fulfilling part of the major requirement.

Students who want to receive credit for college courses taken elsewhere during the summer before matriculation at Cornell should bring the relevant catalog descriptions when they come to campus, even if the transcript is not yet available.

**Freshmen who have taken courses at Cornell** should ask the Office of the University Registrar, 222 Day Hall, to send transcripts to the college records office, 144 Goldwin Smith Hall.

### Further Information

For further information about advanced placement, students should contact the person in the appropriate college or school listed below. Entering freshmen should have their advanced placement test scores sent to their school or college office.

*College of Agriculture and Life Sciences*  
Ruth K. Stanton  
192 Roberts Hall  
*College of Architecture, Art, and Planning*  
M. Sophie Newhart  
147 Sibley Hall  
*College of Arts and Sciences*  
Michele T. Crane  
144 Goldwin Smith Hall  
*College of Engineering*  
Jane H. Pirko  
170 Olin Hall  
*School of Hotel Administration*  
Mary Milks  
138 Statler Hall  
*College of Human Ecology*  
Joyce H. McAllister  
146 Martha Van Rensselaer Hall  
*School of Industrial and Labor Relations*  
Virginia W. Freeman  
101 Ives Hall



## Special Academic Services and Programs

### Freshman Seminar Program

Each semester, the Freshman Seminar Program presents a choice of more than seventy courses offered by over twenty different departments in the humanities, social sciences, expressive arts, and, occasionally, the sciences. These courses share one purpose: to offer the student practice in writing English prose. They also ensure that beginning students may enjoy the benefits of a class no larger than eighteen students. In addition, Freshman Seminars follow a common set of guidelines:

- 1) at least thirty pages of assigned writing
- 2) at least eight (and, at most, about fourteen) written assignments
- 3) opportunities to revise essays
- 4) ample classroom time spent on work directly related to writing
- 5) reading assignments small enough to permit regular, concentrated work on writing
- 6) individual conferences

The present catalog describes representative Freshman Seminars, but offerings are subject to change from semester to semester (see pp. 204–208).

Most undergraduate students are required to take two courses in the Freshman Seminar Program. Architecture, Art, and Planning students, however, need only one Freshman Seminar; Hotel students must fulfill their requirement through Hotel Administration 165, which is to be taken with Hotel Administration 265 during the first two semesters at Cornell. Agriculture and Life Sciences students can take Freshman Seminars or choose from among a variety of writing courses outside the Freshman Seminar Program to fulfill their requirement.

The Freshman Seminar Program reserves proportional space in each seminar for every college; because enrollment is limited, however, some students may not get their first choice. Students should therefore be prepared to come to a Freshman Seminar course exchange session and take a second- or third-choice seminar. Each term, the Freshman Seminar offerings are described in a brochure available from college registrars, and just before registration and course exchange these brochures are updated in a supplement also available from college registrars.

Special arrangements are made for nonnative speakers of English scoring less than 600 on the Test of English as a Foreign Language (TOEFL) examination and for freshmen needing more than the usual amount of work in writing. Freshmen (or transfers needing Freshman Seminar Program credit) in either of these two categories should attend the assessment sessions offered by the Writing Workshop during orientation week (the workshop offices are on the first floor of Rockefeller Hall; the director is Nancy Kaplan). The Writing Workshop also offers (1) Writing 137 (fall) and 138 (spring), Tutorials in English Composition (designed for students who have had little training in composition or who have serious difficulty with writing assignments), and (2) a walk-in service to help students with specific problems of essay-writing.

Transfer students should see if college-level work done elsewhere will exempt them from all or part of the written expression requirement. Upper-division students can often take a writing course outside the Freshman Seminar Program and petition to have it satisfy part of the requirement. Students should consult the person responsible for advanced placement in their colleges before approaching the Freshman Seminar Program staff about transfer credit.

Students in the College of Arts and Sciences who are particularly well prepared in composition and who have three English advanced placement (AP) credits must still take two Freshman Seminars to complete their requirement, but they are eligible to take English 270, 271, or 272 (or any other Freshman Seminar). Arts students with six English AP credits need only one Freshman Seminar to complete the college requirement. Agriculture and life sciences, engineering, and industrial and labor relations students with three English AP credits are exempted from one writing course, and students in these three colleges with six English AP credits are exempted from two writing courses. Students from other colleges should check with staff in charge of advanced placement in those colleges about English AP credit and the writing requirement.

Each fall, students in colleges that have not conducted registration over the summer will attend a special Freshman Seminar registration separate from University course registration. The dates for Freshman Seminar fall registration and course exchange appear in the Freshman Seminar brochure; the dates for spring pre-course enrollment and registration—which coincide with the Freshman Seminar dates—appear in the Cornell University calendar in the front of this Announcement.

The director of the Freshman Seminar Program is Fredric V. Bogel, professor of English; the assistant director is Katherine K. Gottschalk, senior lecturer in English. The administrative aide is Diane P. Freedman. The program's offices are in 159 Goldwin Smith Hall (telephone: 256-4061).

### Field Service and Study Abroad

Field service and study abroad provide students with invaluable experiences. Most opportunities are offered through individual departments or colleges and are described in those sections. Students are also encouraged to consult the Career Center for information on programs that are not directly sponsored by the University.

### The Learning Skills Center

For a description of the services provided by the Learning Skills Center, see the section "Minority Education," p. 16.

### Reading and Study Skills Program

This program offers courses in speed reading and a variety of study skills. Special emphasis is placed on how to read texts, budget time, and prepare for examinations. A credit course on reading and learning strategies is offered through the College of Human Ecology. In addition to the minicourses, audio cassettes on these topics are maintained at the center, in the Media Room of Uris Library, the reserve desk of Mann Library, room C111 of the College of Veterinary Medicine, and at the three student unions. The Reading and Study Skills Program is located in the Learning Skills Center, 375 Olin Hall (telephone: 256-8269).

### Tutoring Services

Tutoring is available through many departments and organizations at Cornell. Students who need tutoring may contact their school or college offices, their faculty advisers, or their professors for information about sources of tutoring assistance.

**Interfraternity Council.** The Interfraternity Council provides tutors without fee to any student who needs help with a course. Tutors are available in virtually every field. For more information, call 256-5183 or stop at the IFC office, 210 Willard Straight Hall.

## Counseling and Academic Advising Services

Students who receive degrees without ever needing or wanting advice are rare. The University encourages students to ask for assistance and advice whenever they need it, and numerous advising services exist on campus.

Many students are specifically assigned a faculty adviser for all or part of their undergraduate career. Faculty members can provide a wide range of advice, from suggestions about courses to take, books to read, or facilities to use, to specific information about college or departmental regulations.

Most schools and colleges have advising programs, which are described in those sections. Offices that offer specific kinds of counseling, available to any student at Cornell, are briefly described below.

## Career Center

The Career Center, an academic support service, works in conjunction with college career planning and placement offices to help students explore, discover, and choose a career. It provides assistance in six major areas: academic and career counseling, career information, health careers, job hunting, special programs for minorities, and professional and graduate schools. Professional advisers and counselors and student advisers are available. Offices are located in two buildings, Sage Hall and Barnes Hall, and are open Monday through Friday from 8:00 a.m. to 4:30 p.m.

The office in Sage Hall, at 14 East Avenue (telephone: 607/256-5221), houses an extensive career library with up-to-date resources on careers and career decision making, employment, graduate and professional schools, study abroad programs, and video and audio tapes. It also offers seminars on applying to graduate and professional schools, aids students in job hunting through on-campus interviews with employers, and provides special programs and advice for minority students.

The office in 203 Barnes Hall provides academic and career counseling to individuals and groups, conducts academic and vocational testing, and gives language placement tests for students enrolling in foreign language courses (telephone: 256-5044). It maintains a credential service for letters of recommendation, transcripts, and other personal documents retained and distributed by request to employers and graduate and professional schools (telephone: 256-3559), and provides special information resources and advice for students interested in careers or professional schools in the health fields (telephone: 256-3519).

## Services for the Disabled

As a university committed to the principle of equal opportunity, Cornell's academic and social resources must be fully available to all who are qualified, including persons with disabilities such as loss of sight, hearing impairments, neurological limitations, limited mobility, or learning disabilities.

Cornell desires to provide access in as integrated and natural a setting as possible; the emphasis is on bringing the student to the class rather than on bringing the class to the student. A campus-wide program to provide ramps, curb cuts, and remodeled rest-room facilities has been completed. Special

parking permits for the disabled can be obtained from the Traffic Bureau, and arrangements for accessible accommodations in residence hall facilities are available for individual students.

Kathleen Donovan, Office of Equal Opportunity, 217 Day Hall (telephone: 256-5298), is the campus coordinator for matters concerning the disabled. Those who have any questions are urged to get in touch with her for discussion and, where appropriate, referral to the proper resource person. Anyone who will need special accommodations either in his or her living situation or with classes should contact her as soon as possible.

Each school within Cornell University has designated a representative to assist disabled students with such matters of academic concern as course scheduling, classroom changes, and special provisions for taking examinations. Their names are listed in a brochure for disabled students that may be obtained from the coordinator for the disabled, 217 Day Hall.

## Minority and Special Opportunity Programs

Cornell University administers a variety of programs designed to provide academic and personal support to minority and low-income students who meet program guidelines.

In 1963 President James A. Perkins founded the Committee on Educational Projects (COSEP) in accordance with Cornell's mission as a land-grant institution and its founding philosophy: "I would found an institution where any person can find instruction in any study." Through COSEP Cornell seeks to recruit and admit minority students with outstanding credentials as well as those with strong promise for academic success but whose secondary school profiles are not as competitive because of disadvantaged educational and economic backgrounds. COSEP provides a comprehensive support program for minority students who have been admitted to one of Cornell's undergraduate schools or colleges.

The main goals of the program are to:

- 1) Assist, during the selection process, in identifying qualified minority students with disadvantaged educational and economic backgrounds as well as those who traditionally have been underrepresented in higher education.
- 2) Provide minority students with academic, tutorial, and counseling services to ensure progress on the completion of their degrees.
- 3) Provide financial support, administered through the Office of Financial Aid, that is sufficient to meet the demonstrated need of minority students enrolled at the University.

The COSEP program is not intended to provide remedial support. Therefore the academic and personal freedom of the students participating in the program is not restricted. Participation in the COSEP program is voluntary and may be requested by minority students who are United States citizens or permanent residents. All minority students are encouraged to take full advantage of the opportunities offered at Cornell.

## The Learning Skills Center

The Learning Skills Center (LSC) is the academic support unit of COSEP. The LSC provides academic advising, preparatory instruction in core courses, (biology, physics, English, chemistry, and mathematics), and tutorial and study sessions. A prefreshman-year summer program gives new students an opportunity to pursue college courses before fall enrollment. The LSC has study hall accommodations and provides students access to typewriters, calculators, a reserve library, course

notes, previous examinations, and tapes. Academic advising, including help in specific areas of study, scheduling, or programming information is provided by LSC staff.

## State Programs (HEOP and EOP)

In 1969 COSEP was expanded by the addition of the New York State Educational Opportunity Program (Colleges of Agriculture and Life Sciences, and Human Ecology, and the School of Industrial and Labor Relations) and the Higher Educational Opportunity Program (Colleges of Architecture, Art, and Planning; Arts and Sciences; and Engineering, and the School of Hotel Administration). These programs are called EOP and HEOP respectively.

HEOP gives students who would not be admitted through regular admission selection an opportunity to attend Cornell. The programs provide students with academic supportive services, counseling, and financial aid. Regardless of their ethnic background, New York State residents who are both academically and economically disadvantaged are eligible.

## Student Services

Services include student activities, work-study jobs, leadership training, and assistance in development of organizational skills and implementation of programs. A general counseling-referral service is also provided by the office. COSEP has associate staff members in the Financial Aid Office, the Career Center, and Gannett Psychological Service to assist students in these areas.

## Office of Minority Educational Affairs

Over the years Cornell has made considerable strides in enriching the academic, cultural, and social experience of minority students through the Office of Minority Affairs. This office, which is the center of activity for minority students, ensures that a variety of support services are available to assist students in making a more positive academic and social transition to the University. The Office of Minority Affairs represents many things to many people. For some it serves as a forum for political, social, and educational expression. For others it is a home-away-from-home, a place where student organizations evolve, helping to enhance cultural awareness. There are over four hundred organized clubs on campus, and minority student clubs are among the most active. Listed below are many of the organizations of special interest to minority students:

African Students Organization	MESA (Mexican Education Student Association)
Africana Players	Minority Business Student Association
Alpha Kappa Alpha	Minority Education Committee
Alpha Phi Alpha	Minority Education Council
Asian American Coalition	Minority Students in the Social Sciences
Asociación Latina	National Society for Black Engineers
Black Athletic Association of Cornell	North American Indians at Cornell
Black Bio-Medical and Technical Association	Nigerian Association
Black Student Coalition	Omega Psi Phi
Chinese Cultural Society	Pamoja Ni Singers
Club Haitien	Phi Beta Sigma
Cornell Black Agriculturalists	Third World Programming Board
Cornell Undergraduate Law Society	UBIQUITY Publications
Cuban Cultural and Historical Society	Uhuru-Kuumba
Delta Sigma Theta	
Kappa Alpha Psi	

## International Student Office

The International Student Office, 200 Barnes Hall (telephone: 607/256-5243), serves as an information center and provides arrival assistance, housing

information, personal and academic advising and counseling, immigration advising, and financial planning assistance.

## Financial Aid

### Eligibility and Availability

Financial aid resources for undergraduate nonimmigrant foreign students are severely limited at Cornell. Consequently, the competition for these awards is keen, and only a small percentage of each entering class receives assistance. Students who receive financial aid are likely to be those with exceptional academic records, high test scores, strong potential for positive contributions to the Cornell community, and demonstrated financial need. Awards are a combination of scholarship, loan, and on-campus work.

If a student does not receive financial aid upon entering Cornell, there is little chance of obtaining aid in the future, except in the event of an unforeseen financial emergency. Should a student experience an unexpected financial problem after enrolling, he or she should immediately contact the International Student Office for assistance.

Nonimmigrant students who receive financial aid from the University must reapply for aid each year. Application forms are available from the International Student Office.

### Loans and Employment

Short-term emergency loans are available through the International Student Office for students who face unexpected financial crises. Under certain circumstances, long-term loans are also available. Nonimmigrant foreign students are not eligible for the federal work-study program that is administered by the Student Employment Office. Foreign students holding F-1 visas may accept non-work-study employment on campus for up to twenty hours a week. Due to visa restrictions, foreign students may not accept any off-campus employment without permission of the United States Immigration and Naturalization Service. Questions regarding permission to work should be referred to the International Student Office.

*Note:* Foreign students in the School of Hotel Administration who want to fulfill their practice credit requirement by working in the United States during vacations or the summer should contact the Hotel School registrar's office.

## Health Requirement

Foreign students and their dependents must present a chest X-ray taken within twelve months of registration at Cornell or undergo an X-ray upon arrival. Free chest X-ray service is available at the Gannett Health Center. Residents of the following areas are exempt from this chest X-ray requirement: Europe, Japan, Australia, New Zealand, and Canada.

## Registration

All entering nonimmigrant foreign students (including Canadians) must secure clearance from the International Student Office before registration will be permitted.

## Leaves of Absence, Withdrawals, Transfers, Credit-Hour Reductions

Any nonimmigrant foreign student planning to take a leave of absence should check first with the International Student Office. Students taking a leave or withdrawing from the University normally cannot legally remain in the United States. Students graduating or leaving the University should file a Notice of Departure with the International Student Office. Students intending to transfer to other universities in the United States should check the immigration regulations regarding transfer in the International Student Office.

Visa regulations also stipulate that students must carry at least twelve credits each term. Foreign students who are petitioning to drop their course load below twelve credits should contact the International Student Office to determine how such a decision will affect their visa status and financial aid.

## Personal Counseling Services

**University Health Services.** Counseling services are provided in the health center and the Psychological Service. For an appointment at the Psychological Service, the student should call 256-5208 or go to the center.

**Cornell United Religious Work.** A diverse staff of pastoral counselors and advisers, available day and night for consultation, may be reached through the office, 118 Anabel Taylor Hall (telephone: 256-4214).

**Empathy, Assistance, and Referral Service (EARS).** EARS is a peer counseling service offered through the Office of the Dean of Students, available to the Cornell community for walk-in counseling (211 Willard Straight Hall) or telephone counseling (256-EARS or 256-RAGE).

**Suicide Prevention and Crisis Service** is a hotline and referral service for the entire community. In addition to crisis counseling, it provides hotline and referral services for raped or battered women (telephone: 272-1616).

**Office of the Dean of Students,** in 103 Barnes Hall, provides short-term counseling, personal-growth workshops, consultation, and referral (telephone: 256-4221 and 256-3608).

# Student Life and Activities

## Office of the Dean of Students

The primary aim of the Office of the Dean of Students (ODS) is the personal, social, and intellectual development of students and the enhancement of the quality of the educational environment for the benefit of the entire community.

Specific responsibilities of the office include training and development of peer counseling groups such as EARS (Empathy, Assistance, and Referral Service); personal-growth groups that address student concerns in a supportive environment; new-student programs; fraternity and sorority advising; and off-campus life and housing. The office assists individuals who need to know which University department is best equipped to answer any particular question that may arise during the course of the year.

Staff serve as advocates for, and as consultants to, campus groups serving to resolve problems or improve programs. In addition, ODS assumes responsibility for organizing and supporting ad hoc groups to examine issues that cut a cross divisional boundaries, for example, racism, human relations, and alcohol abuse.

A further major responsibility of the office is the assessment and improvement of the University community through research and organizational development.

Various publications are prepared by the ODS, including the *Cornell Calendar*, *Policy Notebook and Digest for Students, Faculty and Staff*, and *Off-Campus Housing in the Ithaca Area*.

Students and staff are always welcome to drop in at the office in Barnes Hall or call (telephone: 256-4221) if they have any questions or concerns.

## Housing

There is sufficient variety among University residences to meet the needs and desires of most individuals. Each year, however, more students than the Department of Residence Life can accommodate want to live on campus. Acceptance to the University does not automatically guarantee a room in a residence hall, but all freshmen who apply for accommodations in residence halls are assured of an assignment their first year, although those who submit late applications may be placed in a temporary assignment at the start of the year.

Personal property is not insured by the University, nor is the University liable for loss or damage to any article of personal property. Students are encouraged to take out personal property insurance on their belongings. Information on personal property insurance is available at the Office of the Dean of Students in 103 Barnes Hall.

The Off-Campus Housing Office in 103 Barnes Hall maintains lists of accommodations that have been voluntarily submitted by local landlords. These lists are constantly changing and must be seen in the office. For more information, the booklet *Guide to Off-Campus Housing* may be obtained from the above office.

Information concerning University housing is available from the Department of Residence Life, Cornell University, 1142 North Balch Hall, Ithaca, New York 14853.

## Dining Services

Cornell Dining provides diverse food service programs for the entire Cornell community.

### Co-op Dining

Co-op Dining is a completely voluntary dining plan serving more than half Cornell's undergraduates as well as many graduate students and other qualified members of the Cornell community. Any student may join.

Co-op Dining offers twelve flexible meal-plan options. These options have a variety of time and meal periods on a five- or seven-day basis. Members are not penalized for switching meal plans to better meet their individual academic routines. Maximum flexibility is included with a two-meal-a-day plan that offers a choice of breakfast or lunch, and dinner daily. Co-op members may also purchase prepaid points to supplement their chosen meal-plan options.

Members eat in convenient dining rooms, located in the residential areas or on the central campus, and are free to select the dining rooms of their choice for each meal. All dining rooms serve a variety of entrées (including one vegetarian entrée at both lunch and dinner) each day. In addition, "prime nights" and specials highlight the Co-op Dining program. Specials may include outdoor barbecues, midnight breakfasts, ice cream sundaes, or the Cross-Country Gourmet dinner series, which has won national acclaim. Menus are posted weekly, and additional information is available through a special menu-information telephone line, 256-DINE.

The cost of each meal-plan option is set at the beginning of each academic year and is automatically billed on a semester basis. Members do not pay New York State sales tax, which is 7 percent.

The Co-op program does not provide meals during University recess periods, including fall semester break, Thanksgiving, Christmas, intersession, spring recess, and summer.

The Co-op Dining program is administered by Cornell Dining, 233 Day Hall (telephone: 256-5392). Each year, all new and transfer students receive a program description and contract. All terms and conditions of the Co-op Dining program are given in the contract, which all prospective members should read carefully before completing and mailing the application.

### Other Dining Services

Dining at Cornell is not limited to the Co-op Dining program. Students who do not choose to join a dining plan, University faculty and staff members, and visitors may choose from a variety of dining rooms on campus. Each dining room has its own atmosphere and menu. Most dining units serve cafeteria style.

**Cash a-la-carte service** is available at five Cornell Dining locations seven days a week, throughout each day. The two newest dining options are the Red Bear Café and Martha's. All cash dining units accept cash, Cornellcard, MasterCard, and VISA cards. Dining service at each unit follows the posted hours of operation but may be limited during the summer session and University recesses such as Thanksgiving, Christmas, intersession, and spring break.

**The Pick-Up** offers a variety of grocery items, beverages, magazines, and personal items. A convenient check-cashing service and a small game room are also provided. The Pick-Up is located on the lower level of Noyes Lodge (telephone: 256-5314).

**Vending operations** provide food, beverage, and snack items in many campus buildings (telephone: 256-5385).

### Catering

Cornell Catering serves the entire Cornell community, either in its private dining rooms, located on the third floor of Robert Purcell Union, or at functions held in many campus locations. Cornell Catering offers food service for a variety of occasions or needs (telephone: 256-5555).

### Kosher Dining

Kosher meals are offered under the auspices of Young Israel of Cornell. Meals are served seven days a week under a wide variety of meal-plan options. Further information is available by writing to the Steward, Young Israel of Cornell, 106 West Avenue, Ithaca, New York 14850.

## University Health Services

The University Health Services provides comprehensive medical care for all full-time undergraduate and graduate students enrolled at Cornell University in Ithaca. Gannett Health Center, located at 10 Central Avenue adjacent to Willard Straight Hall, is open twenty-four hours a day during the school year and is available for overnight care and emergency outpatient service outside of normal working hours. Normal hours are Monday through Friday from 8:30 to 11:30 a.m. and from 1:00 to 4:30 p.m., and Saturday from 8:30 a.m. to 12:30 p.m.

The center's medical staff, under the supervision of the medical director, consists of attending physicians and health associates from the University staff, and consulting physicians and surgeons from the Ithaca area. All medical records are strictly confidential.

For a medical appointment, a student should call 256-4082 or go to the center. For an appointment at the Psychological Service, a student should call 256-5208 or go to the offices at the center. A doctor is available for emergencies twenty-four hours a day (telephone: 256-5155).

The tuition charge covers the cost of the following services for the academic year:

- 1) unlimited visits to Gannett Health Center
- 2) overnight care
- 3) routine diagnostic and X-ray examinations as ordered by Health Services clinicians and performed by Health Services staff
- 4) physical therapy services
- 5) counseling services at the center and in the Psychological Service

Some expenses not covered by the University Health Services program are visits to private physicians or private health care facilities; house calls; hospitalization expenses; hospital charges and fees for surgical procedures; fees for eye examinations for glasses; allergy injections; immunization vaccines and inoculations for travel abroad; initial contraceptive examinations; physical examinations for studies elsewhere or for fellowship applications; expenses for prenatal or obstetrical care; and expenses connected with illness or injury occurring (a) outside of Ithaca while in transit to and from college, on weekend trips, and on vacations away from Ithaca during the academic year; and (b) during the summer, unless the student is enrolled as a summer student.

To cover many of the services not provided free of charge by University Health Services, all full-time registered students and students studying in absentia are automatically enrolled in an accident and sickness insurance plan, underwritten by a private insurance company, that includes a \$20,000 major-medical provision. The plan covers hospital care, charges for surgical procedures, consultations with a private physician or specialist if referred by a Health Services physician, expenses connected with illness or injury outside of Ithaca, and limited reimbursement for allergy injections, prescription

drugs, and most outpatient services. Students are covered by this plan for the entire twelve months. Only by returning a yearly waiver form, which is mailed with the first bursar's bill or available at Gannett Health Center, the Bursar's Office at 260 Day Hall, and at University registration, will students *not* be covered and *not* charged for this plan. The cost of this plan for 1983-84 will be approximately \$140 for the entire twelve months, and the charge will appear on each student's fall tuition bill. Unless students have other health insurance to supplement medical services provided by the University Health Services, they are *strongly urged* to take advantage of this plan. After the waiver process has been completed, a student may be reinstated if the parent's insurance plan drops the student at a certain age or if the student's marital status changes. Application must be made within thirty days of discontinuation of other coverage.

Students who are enrolled in the accident and sickness insurance plan may also enroll their spouses and children for an annual premium. Information concerning this insurance may be obtained at Gannett Health Center or by telephoning 256-6363.

Students' spouses are eligible for benefits identical to those of the student health care program on a prepaid or fee-for-service basis. These services are not to be confused with the supplementary accident and sickness insurance plan. Information and forms for the spouse program may be obtained by writing or visiting the University Health Services, Gannett Health Center, Cornell University, 10 Central Avenue, Ithaca, New York 14853.

## Cornell United Religious Work

Cornell United Religious Work (CURW) coordinates religious affairs at Cornell. Participants in CURW may be involved in denominational, interreligious, or nondenominational activities. The denominational programs include daily or weekly opportunities for worship, study, and interaction. CURW member groups share in support and leadership of interreligious programs such as the Sage Chapel convocations, CIVITAS (Cornell-Ithaca-Volunteers-in-Training-and Service), the Interreligious International Ministry (IRIM), noncredit courses, lectures, conferences, and involvement in varied services to the University community. A diverse staff of pastoral counselors and advisers, available day or night for consultation, may be reached through the office, 118 Anabel Taylor Hall (telephone: 256-4214). This office also has information concerning weekly religious convocations in Sage Chapel and worship opportunities in the local churches and synagogue. Anabel Taylor Hall houses the Commons, a coffeehouse providing a place for informal communication between faculty, staff, and students. Closely associated with CURW but independent of it is the Center for Religion, Ethics, and Social Policy (CRESP), the nondenominational research and action component of religious affairs at Cornell.

## Campus Government

The system of campus government at Cornell consists of four deliberative bodies representing not only the University population as a whole but also its major subdivisions. The system recognizes both the diversity and the unity so basic to the life of an academic community.

The *University Assembly* focuses on matters concerning the entire campus in common, including such day-to-day essentials as transportation, campus store, and health services. Its delegates are drawn from the Student Assembly, the Employee Assembly, and the Faculty Council of Representatives. Each of these groups also has its own separate deliberative body.

The four assemblies together provide a variety of settings in which issues can be effectively discussed and policy considered by those people most directly affected. The Student Assembly consists of twenty-three students elected by the student population, all of whom are voting members, and has legislative authority over the policies of the departments of Dining, Residence Life, Unions and Activities, and the Office of the Dean of Students. It also has authority to review the budgets and actions of these departments. The Employee Assembly is composed of members elected by and representing the exempt and nonexempt employees. It has the authority to examine all University policies affecting the employment environment, including such matters as education/training opportunities, recreation, and special employee needs in the areas of transportation and health services. The Faculty Council of Representatives is the legislative assembly of the University Faculty, which exercises the faculty's responsibility to regulate academic matters (including the calendar) that affect more than one college, school, or other academic division of the University.

Further information may be obtained in the Office of the Assemblies, 165 Day Hall.

## Ombudsman

The Office of the University Ombudsman, 116 Stimson Hall (telephone: 256-4321), assists all members of the Cornell community seeking solutions to a wide range of problems. The main purpose of the office is the just and equitable resolution of conflicts in the University. The office is independent of the University administration and all other groups on the campus. All communications are confidential.

The office can provide information on University policies and practices, help examine alternatives, find proper authorities to resolve the situation, or otherwise seek a resolution to the problem. The function of the office does not take the place of existing grievance procedures, but nonetheless it stands ready to hear and investigate complaints at any time. The office does not have the authority to reverse decisions or punish anyone. The office does make requests for reconsideration or change in decisions and will advocate an equitable solution when a complaint has merit. In addition to hearing and investigating complaints, the office may investigate problems on its own initiative and report its findings and recommendations to appropriate people in the University.

## Judicial System

The judicial administrator's office receives and investigates complaints brought by students, other members of the University, and offices on campus involving alleged violations of the Campus Code of Conduct or the Statement of Student Rights. The judicial administrator may also initiate investigations. If there is reasonable cause to believe that a violation has occurred, the judicial administrator files charges and reminds the defendant of the services of the judicial adviser. Personal details of complaints and judicial actions are considered private information.

Many judicial cases are resolved by summary decision. In such decisions, the judicial administrator proposes a fine or a remedy, or both, that the parties to the case choose to accept. Either the defendant or the judicial administrator may, however, decide instead to take the case to a formal hearing. A complainant who is dissatisfied with the judicial administrator's action in a complaint may appeal that action to the University Hearing Board, which then decides whether or not to refer the case to an adjudicatory hearing.

Questions about the judicial system should be directed to the Office of the Judicial Administrator, 431 Day Hall (256-4680); hours are 9:00 a.m.—4:30 p.m. Monday through Thursday, and 9:00 a.m.—4:00 p.m. Friday. The *Policy Notebook and Digest for Students, Faculty and Staff*, available from the Office of the Dean of Students, details the principles and policies governing campus conduct. For further information, consult the staff in the Office of the Dean of Students, 103 Barnes Hall.

A judicial adviser is available, without charge, to provide legal counseling and legal assistance to those accused of violating University rules and regulations, including academic integrity violations. The Office of the Judicial Adviser is not associated with the Cornell Legal Aid Clinic and is not equipped to handle legal problems arising outside the University context. The Office of the Judicial Adviser is located in B12 Ives Hall (256-6492). The hours of this office change each semester and are posted on the office door, along with telephone numbers where an adviser can be reached when the office is not open. Further information about the Office of the Judicial Adviser can be obtained by calling that office.

## Unions and Activities

The Department of Unions and Activities oversees the three University union buildings, which serve as campus community centers and offer a wide variety of services and facilities: Willard Straight Hall, Noyes Center, and Robert Purcell Union. A partial list of facilities includes dining areas, browsing libraries, a theater, billiard and game rooms, study lounges, meeting rooms, a pottery shop, a tailor shop, darkrooms, and a unisex hair-styling salon. Among the many special services available to students are a central ticket office; a central reservations office for campus facilities; a rental service for audiovisual equipment and phonograph records; dry-cleaning service; service desks where newspapers, magazines, and sundries are sold; an art-lending library; and a check-cashing service.

Unions and Activities programming organizations include programming and policy boards that govern each of the three union facilities, as well as the following: the Alfalfa Room, a lounge area in Warren Hall where sundries and snacks are sold; Cornell Cinema, the campus film program; the Cornell Concert Commission, which produces popular concerts; the University Unions Program Board, which presents major lectures, touring theatrical productions, and major social events, including Mardi Gras and Springfest; Wilderness Reflections, which presents summer orientation programs for new students in an outdoor setting; and the Third World Student Programming Board, which presents events to highlight minority and ethnic cultures. The services and activities support the educational objectives of Cornell, provide opportunities for personal relationships among members of the community, and fulfill Willard Straight's objective: "the enrichment of the human contacts of student life."

### Union Hours

Willard Straight Hall  
7:00 a.m.—11:00 p.m., 7 days a week

Noyes Center  
10:00 a.m.—12:30 a.m., Sunday–Thursday  
10:00 a.m.—1:30 a.m., Friday and Saturday  
(Building opens for dining earlier)

Robert Purcell Union  
7:00 a.m.—2:00 a.m., Monday–Saturday  
7:00 a.m.—1:00 a.m., Sunday  
(Hungry Bear Diner: 10:00 p.m.—3:00 a.m. daily;  
Sundays 2:00–5:30 p.m.)

## Fraternities and Sororities

For many students, fraternity or sorority life is an integral part of the Cornell experience. There are currently fifty fraternities at the University, with about twenty-five hundred students, or 38 percent of the men undergraduate students, as members. There are thirteen sororities, with about twelve hundred students, or 23 percent of the women undergraduates, as members. Each chapter has its own flavor and environment.

As one of the largest systems in the country, diversity is the key to its continuing growth. While satisfying room and board needs, fraternities and sororities provide opportunities for friendships, leadership, and personal growth. Three student-run governing boards oversee the many programs associated with fraternities and sororities. These boards are the Interfraternity Council, the Panhellenic Council, and the Black Greek Council.

## Athletics

At Cornell, athletics are designed to encourage the participation of every able and interested student in varsity sports or the extensive intramural program. Cornell supports one of the largest intercollegiate athletics programs for men and women in the country and belongs to the Ivy League. There is intercollegiate competition for men in baseball, basketball, crew, 150-pound crew, cross-country, fencing, football, lightweight football, golf, gymnastics, hockey, lacrosse, polo, rifle, sailing, skiing, soccer, squash, swimming, tennis, track, and wrestling.

Cornell fields seventeen intercollegiate women's teams—more than any other college or university in New York State. The women's athletics program, one of the largest in the nation, includes basketball, bowling, crew, cross-country, fencing, field hockey, gymnastics, ice hockey, lacrosse, polo, skiing, soccer, swimming, synchronized swimming, tennis, track, and volleyball.

## Information Services

The Information and Referral Center assists students, faculty, staff, and visitors by distributing free literature, answering questions, and giving directions. The center responds to questions over the telephone, in the mail, and on a walk-in basis. Questions to which answers are not readily available will be researched by the center staff. The center's aim is to minimize confusion and to help people avoid the necessity of contacting several offices with their questions. The center is in Day Hall near the East Avenue entrance and is open Monday through Saturday from 9:00 a.m. to 5:00 p.m. The telephone number is 607/256-6200.

Campus tours originate from the Information and Referral Center Monday through Friday at 11:15 a.m. and 1:30 p.m., Saturday at 11:15 a.m., and Sunday at 1:00 p.m. From November 1 through March 31 the weekday tours are given at 1:30 p.m. only.

In Willard Straight Hall there is an information desk known as the Straight Desk. It differs from the Information and Referral Center in that it does not have a library of free literature and does not conduct tours. It does, however, sell snacks, magazines, and newspapers. The Straight Desk is open from 8:00 a.m. to 10:00 p.m. Monday through Friday, 9:00 a.m. to 10:00 p.m. on Saturdays, and 10:00 a.m. to 10:00 p.m. on Sundays. The telephone number is 607/256-3450.



## Transportation Services

### Traffic and Parking

To provide a safe walking environment for pedestrians on campus and to reduce the impact of motor vehicles on the limited campus parking facilities, Cornell has restricted vehicle access to the central campus. Cornell University encourages ride sharing and the use of alternative modes of transportation such as public transit, bicycling, and walking.

All on-campus parking (except in certain metered and time-zone areas) is by permit only and is subject to posted restrictions; vehicular access to the interior campus is restricted Monday through Friday from 7:30 a.m. to 5:00 p.m. Special parking restrictions are posted where applicable. Parking regulations are in effect throughout the year.

New York State motor vehicle and traffic laws are enforced on the Cornell campus.

All members of the campus community (students, faculty, staff, and employees of non-University agencies located on University grounds) are required to register annually with the Traffic Bureau any motor vehicles (including motorcycles) in their possession which may at any time be parked on Cornell property. This registration information ensures that the owner or operator may be rapidly identified and contacted if necessary; for example, if a parked vehicle is involved in an accident, must be moved immediately, or has been left with its lights on. There is no charge for vehicle registration; however, a registration sticker is not in itself a parking permit.

Information on traffic and parking regulations, and parking permits, are available at the traffic and information booths on campus and at the Traffic Bureau on Maple Avenue. The bureau will be glad to assist any individual with general inquiries or special problems and requests (telephone: 256-4600).

**Bus service.** A campus bus service operates between peripheral lots and the central campus; several community bus routes connect the University with surrounding residential and commercial areas.

Information about the campus bus system may be obtained from the Campus Bus Service (telephone: 256-3782). Schedules for on-campus and off-campus service are posted in all bus-stop shelters and are also available from the Traffic Bureau, the Information and Referral Center in the Day Hall lobby, Robert Purcell Union, and the Willard Straight Hall Information Desk.

## Public Safety Services

### Emergencies

Accidents, crimes, fires, and all other emergencies on campus should be reported immediately to the Department of Public Safety (telephone: 256-1111). The Department of Public Safety is located in G2 Barton Hall and is open twenty-four hours a day. Public telephones to report emergencies, seek information, or to report suspicious activity are located throughout the campus and can be readily recognized by blue lights above them.

### Lost and Found

The central Lost and Found Office, operated by the Department of Public Safety, is located in G18 Barton Hall and is open from 10:00 a.m. to 4:00 p.m., Monday through Friday (telephone: 256-7194). Lost articles are often turned in to the information desks in Day Hall and Willard Straight Hall and other central offices, but all such items are eventually turned over to this central lost and found.

## University Services Bureau

The University Services Bureau is responsible for scheduling and staffing extra-University functions that require public safety personnel for traffic direction or crowd control. The manager of the University Services Bureau may be contacted at 256-7406.

### Crime Prevention Section

The Crime Prevention Section provides lectures and orientation to various University groups on topics ranging from general public safety services to drug abuse, crime prevention, and rape and assault prevention. Persons interested in these free programs should contact the manager of the Crime Prevention Section at 256-7302.

## University Registration

University registration is the process by which the University registrar and colleges certify the eligibility of students to enroll in courses and purchase or use a variety of services available at the University, such as Cornellcard, Co-op Dining, libraries, special bus passes, and housing. University registration includes the issue or validation of the student identification card and the collection of information needed for the student directory and state and federal reports. University registration is held on the dates stated in the University calendar at a time and place announced well in advance of the beginning of each semester.

## Late Registration

The final date for late registration coincides with the last day for adding courses. Late registrants are assessed a late processing charge. Requests to waive the charge will be acted on favorably only for reasons of academic involvement.

The University does not permit after-the-fact registration in which persons attend classes and pass courses before seeking to register and receive official course credit.

The University reserves the right to require unauthorized nonregistered persons who attend classes or in other ways seek to exercise student privileges to leave the University premises. The University registrar will notify the appropriate college or school about such cases and ask that office to contact the person concerned.

### Late Registration Fee

Late Period	Amount
3 weeks	\$50
4 weeks	60
5 weeks	70
6 weeks	80
After 6 weeks, each additional week	25

## Course Enrollment

Course enrollment for each semester at Cornell takes place partway through the preceding semester. Dates are announced in advance and are usually posted in the school and college offices. Course enrollment generally runs for two weeks. Each college or school notifies students about special procedures. Students are often expected to meet with their advisers during this two-week period to check that the courses they plan to take will ensure satisfactory progress toward a degree. Students complete an optical-mark course enrollment form, then return the form to their college office. The forms are processed, and 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 late fee. The fees are listed in the chart in the following section.

## Course Add/Drop/ Change Period

Students may adjust their schedules during add/drop/change periods. The length of the periods varies according to colleges. An optical-mark 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 chart below for course add/drop/change fee.

### Late Course Enrollment and Late Add/Drop/Change Fees

Academic Unit	Late Course Enrollment Fee	Late Course Add/Drop/Change Fee
College of Agriculture and Life Sciences	No fee	No fee
College of Architecture, Art, and Planning	\$10	\$10*
College of Arts and Sciences		*
College of Engineering	\$10	\$10
Graduate School	\$10	\$10
School of Hotel Administration	No fee	No fee
College of Human Ecology	\$10	\$10*
School of Industrial and Labor Relations	No fee	No fee
Summer Session and Extramural Courses	†	†
Veterinary Medicine	No fee	No fee

\*Consult the college office for special considerations and requirements.

†Consult the Summer Session Announcement and the Division of Extramural Courses brochure for fees.

## Class Schedules and Attendance

### 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 8:00 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 Instruction. 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 such examinations shall be scheduled with the Examination and Room Coordinator in 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 on 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 faculty. All such exceptions shall 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. 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 the express permission of the dean of the faculty in accordance with existing faculty legislation.

## 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.

## Internal Transfers

Transfer from one undergraduate unit to another is not guaranteed. A student in good standing may apply to transfer from one college to another within the University. It is necessary for an internal transfer to inform the admitting college of the acceptance of admission within seven days of the offer of admission. Students interested in transfer within the University should consult with the appropriate school or college office.

## Privacy of Records

According to federal law, grades are restricted information and may be released only to the student or at the student's written request. Thus grades earned on examinations or in courses may not be posted by name. Posting by student ID number is permissible. Graded papers and examinations, if returned, must be returned to individual students and should not be accessible to anyone but the author. For example, setting batches of papers and examinations in a box or on a table is inappropriate and illegal.

## Course Numbering System

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., B&PA, Law, Vet.).

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.

## Guide to Course Listings

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

Business and Public Administration  
Law  
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 in the *Course and Time Roster* and 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.

## 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 *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	4	12.0
CEH 100	B	3.0	3	9.0
DEA 111	C	2.0	3	6.0
<b>Total</b>			<b>16</b>	<b>42.0</b>

To arrive at the term average, add the products (credits × 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.

## Incomplete

The symbol of *Incomplete* is only appropriate 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.

An *Incomplete* may not be given merely because a student fails to complete all course requirements on time. It is not an option which may be elected at the student's own discretion.

While it is the student's responsibility to initiate a request for an *Incomplete*, reasons for requesting an *Incomplete* 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 *Incomplete* and the restriction, if any.

It is the responsibility of the student to see that all *Incompletes* 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.

## 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 upon 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 participation in courses offered by the Department of Physical Education and Athletics or by participation on an intercollegiate athletic team as a competitor or manager, performing in the marching band, or participating in an athletic club or organization recognized by the director of physical education as fulfilling the physical education requirement.

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. See the Department of Physical Education or your college office to establish postponements or waiver of the requirement. Questionable or unusual cases may be resolved by petition to the Faculty Committee on 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.

## Student Responsibilities

In extracurricular affairs and conduct, Cornell students have today, as they had in the University's infancy, maximum freedom to govern themselves and responsibility for the use they make of this freedom. The student, both as an individual and as a member of any student organization, however, is responsible for adhering to all applicable regulations set forth in the *Policy Notebook and Digest for Students, Faculty and Staff*. Copies of this booklet are available in the Office of the Dean of Students. In addition to the Campus Code of Conduct, the *Policy Notebook* contains a Statement of Student Rights, a Code of Academic Integrity, the University policy on access to and release of student records, information on the University judicial system, library and motor vehicle regulations, and other policies and regulations.

Students are responsible for meeting all requirements for the courses in which they are enrolled, as laid down 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 necessary to complete 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.

## Student Records

The University policy on access to and release of student records conforms to the Family Educational Rights and Privacy Act of 1974. See the *Policy Notebook and Digest for Students, Faculty and Staff* for details of University policy.

## Bursar Information

### Tuition, Fees, and Expenses

#### Tuition for Academic Year 1983-84

##### Endowed Divisions

###### Undergraduate

Architecture, Art, and Planning	
Arts and Sciences	
Engineering	
Hotel Administration	
Unclassified division	\$8,900

###### Graduate

Graduate School (with major chairman in an endowed division)	8,900
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###### Professional

Business and Public Administration	9,500
Law School	9,270

##### Statutory Divisions

###### Undergraduate

Agriculture and Life Sciences	
Human Ecology	
Industrial and Labor Relations	
New York resident*	3,740
Nonresident*	6,050

###### Graduate

Graduate School (with major chairman in agriculture, human ecology, or industrial and labor relations)	4,310
Graduate School—Veterinary medicine	6,350

###### Professional

Veterinary medicine	
New York resident*	6,350
Nonresident*	7,590

##### Summer Session

Per credit	\$180
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##### Extramural Division

Per credit	\$213
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##### Other Tuition and Fees

In absentia fees	
Graduate	\$200 per term
Undergraduate	\$12.50 per term
B&PA and Law	\$75 per term

Excess hours tuition rate for students in statutory units taking extra endowed credits

Per credit hour	\$210
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*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 by the college.

## Fees and Expenses

Undergraduate applicants to Cornell pay a nonrefundable \$35 application fee when submitting an application for admission. The graduate application fee is \$35.

### Acceptance Deposit

Starting in the fall of 1983, an acceptance deposit of \$200, applicable to the University charges for the final semester at Cornell, will be required. If a student does not enter in the semester for which the deposit is paid, or does not formally withdraw before July 1 for the fall semester or December 1 for the spring semester, or does not complete at least one semester at the University, the deposit is forfeited. This acceptance deposit only affects undergraduate students entering Cornell in the fall of 1983 or in subsequent semesters.

### Refund Policies

Part of the amount personally paid for tuition will be refunded if the student obtains an official certificate of Leave of Absence or Withdrawal from the office of the dean or director of the academic division involved. Students who terminate their registration with the University during a regular term in this manner will be charged tuition from the University registration day to the effective date of the certificate as follows: first week, 10 percent; second week, 20 percent; third week, 30 percent; fourth week, 40 percent; fifth week, 60 percent; sixth week, 80 percent; seventh week and thereafter, 100 percent. No charge will be made if the effective date is within the first six days, including University registration day.

**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 Information

### Billing

Tuition will be billed in July and December and must be paid prior to registration. All other charges, credits, and payments will appear on monthly statements mailed around the tenth 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 arrange for payment by August 16 if they plan to

register for the fall semester. University policy precludes the use of any 1983-84 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 (telephone: 607/256-2336).

### Cornell Installment Plan (CIP)

Cornell offers to all students a monthly installment plan for payment of University expenses. Information about this plan is mailed to parents of continuing students in April of each year and to parents of incoming freshmen and transfers in May of each year.

### Multiple-Year Tuition Prepayment Plan

This plan is available to the parents of students who are not financial aid recipients. Two, three, or four years' tuition may be paid at the tuition rate in effect for the next full school year. Future tuition increases do not affect participants for the duration of their prepayment plan. For further information, interested persons should contact the Office of the Bursar, Cornell University, 260 Day Hall, Ithaca, New York 14853 (telephone: 607/256-2336).

## Medical Insurance

The medical insurance charge on the August billing statement is for insurance for hospitalization, surgical fees, and major medical coverage for the period of August 29, 1983 through August 28, 1984. The cost of this insurance is lower than the average cost of comparable coverage under other group accident and health insurance policies.

For those who do not want medical insurance coverage, a medical insurance waiver form (included with the August statement) must be completed and returned no later than September 28, 1983. Waivers cannot be processed after this date.

## Tuition Insurance

To provide a more comprehensive refund program, Cornell makes available the Tuition Refund Plan. This plan provides refunds of tuition in the event of absence or withdrawal for medical or emotional reasons. Students should contact the Office of the Bursar for further information.

## Cornellcard

Cornellcard is a University charge card that can be used for making purchases on campus. Any registered, full-time, matriculated student may apply for a Cornellcard by filling out an agreement form. A \$5 annual nonrefundable fee is assessed the first time a charge is made. The replacement fee for a lost card is \$10. Itemized monthly statements, which are mailed to students, must be paid by the due date on the statement, or finance charges of 1 1/4 percent per month (15 percent annual rate) will be assessed. All accounts must be paid in full before each registration period. Accounts with unpaid balances at the close of a semester (other than for the current monthly charges) may not be renewed, and University registration will not be permitted, nor transcripts issued or degrees conferred, until the past-due balance has been paid. The Cornellcard is

nontransferable. Loss, theft, or possible unauthorized use should be reported immediately to the Cornellcard Office, 260 Day Hall (telephone: 607/256-6324). The maximum permissible account balance at any one time is \$400. Credit privileges will be suspended on any account in excess of the credit ceiling. A brochure is available on request from the Office of the Bursar.

## Bad-Check Policy

*Any check not honored by a bank will be charged to a student's bursar account along with a \$10 returned-check fine.* These charges will be subject to a finance charge at the rate of 1 1/4 percent per month (15 percent annual rate).

Check-cashing privileges will be suspended for at least one semester for anyone who writes two or more bad checks during the semester. In addition, Cornellcard charging privileges will be suspended. Students who issue four bad checks are subject to disciplinary action through the University judicial system and will have their check-cashing privileges permanently suspended along with Cornellcard charging privileges.



## Programs of Financial Assistance

Cornell University offers a variety of scholarships, grants, employment opportunities, and loans to students who could not otherwise attend the University. To ensure that no qualified applicant is prevented from enrolling owing to lack of funds, Cornell has developed a comprehensive financial aid program. Since the requirements and application procedures for the various programs are complex, it is important for students to read the financial aid information sheet put out by the Office of Financial Aid every spring and usually available in April or May. Questions about any aspect of applying for awards, the award announcement, and program provisions are welcome at the Office of Financial Aid, Cornell University, 203 Day Hall, Ithaca, New York 14853.

To be eligible for need-based assistance, a student must be enrolled full-time in a degree program at Cornell, be eligible to register in a college or division, and not owe a refund from any grant or loan or be in default on any loan received to attend Cornell. Students on leave of absence and undergraduates registered in absentia are not eligible to receive Cornell assistance.

New students and continuing aid recipients who have met application deadlines have top priority for receiving undergraduate aid. Continuing students applying for aid for the first time are considered on the basis of remaining funds.

Undergraduate financial aid at Cornell is awarded on the basis of financial need. The University follows closely, but does not strictly adhere to, the needs analysis procedures established by the College Scholarship Service. In addition, the composition of the financial aid package (proportion of self-help/scholarship) is influenced by the ratings of the college or school admissions selection committees. Financial aid packages will not change because of less-than-expected academic performance for at least two years from the date of the initial award. However, as in the past, aid packages may vary in subsequent years, based on changes in family financial circumstances, increased costs, and the availability of federal funds.

**Applications** for the 1984-85 academic year will be available from the Office of Financial Aid in December, 1983. Whether or not they are already receiving aid, undergraduates must submit applications by March 15, 1984. Students should consult the brochure *Financial Aid Information*, 1983-84, for further information.

**For information** concerning financial aid programs, please consult the following offices:

*Undergraduate and graduate students:* Office of Financial Aid, Cornell University, 203 Day Hall, Ithaca, New York 14853 (607/256-5145)

*International students:* International Student Office, Cornell University, 200 Barnes Hall, Ithaca, New York 14853 (607/256-5243)

*Student employment and the Cornell Tradition (undergraduates only):* Student Employment Office, Cornell University, 203 Day Hall, Ithaca, New York 14853 (607/256-3497).

## Non-University Financial Aid

State loan proceeds will usually be disbursed by a check made payable to the student and Cornell University for the entire amount. The Office of the Bursar will credit this amount to the student's account when the check is submitted. *Finance charges on state loan amounts are not waived unless Cornell is responsible for late processing.*

National Merit Scholarships are paid to the student in the form of a check drawn by the National Merit Corporation and sent to the Office of Financial Aid. If students wish to apply the amount of the award toward payment of their bill, they must personally pick up the check from the Office of Financial Aid, 203 Day Hall, and present it to the cashier, 260 Day Hall. The National Merit Corporation has requested that the University not process its checks through use of power of attorney.

Other scholarships from sources outside the University are credited to the initial bill if they have been received prior to the date the bill is prepared. Outside awards received after the initial billing will be applied towards unpaid charges as they are received. *Any finance charges caused by late receipt of these awards will be the student's responsibility.* It is important, therefore, that the student arrange with any outside scholarship donors to have awards mailed to the University Office of Financial Aid as promptly as possible.

If non-University scholarships have been received and all charges have been paid, a check will be issued in the name of the student. These checks may be picked up in 260 Day Hall.

Please remember that undergraduate students receiving aid from the University must personally report receipt of any outside scholarship sources to the Office of Financial Aid.

## New York State Tuition Assistance Program (TAP)

New York State residents whose New York State net taxable income for 1982 was \$25,000 or less are, upon application to the New York State Higher Education Services Corporation (NYHESC), eligible to receive a Tuition Assistance Program (TAP) award. Students from families with higher income levels may also qualify for an award if there are additional children in college. TAP awards can range from \$100 to \$1,100 per semester. Students must apply annually for their awards by completing a TAP application and mailing it to NYHESC.

An award certificate will be sent by NYHESC informing applicants of their award eligibility. A copy of the award certificate must be submitted to the Office of the Bursar before credit can be claimed. In disbursing awards to students' accounts, the University is responsible for certifying the amount of tuition for each recipient and that each is enrolled full-time in an approved program and is in good academic standing. The definitions of each of these terms are as follows.

**Enrolled full-time:** enrollment for 12 credits or more per semester.

**Good academic standing:** Students receiving awards must meet the following provisions to maintain good academic standing.

- 1) *Pursuit of program:* Freshmen are required to complete a minimum of 6 credits per semester; sophomores, 9 credits per semester; and juniors and seniors, 12 credits per semester. Standards for graduate students are determined by each recipient's Special Committee.
- 2) *Satisfactory academic progress:* Each recipient must maintain eligibility to enroll each semester in his or her degree-granting college.

Any New York State resident receiving a tuition benefit administered by Cornell is obligated to apply for a TAP award. Graduate students receiving aid from Cornell for their tuition who are eligible for TAP and choose not to apply will be billed \$300 per semester.

This program is administered by the Office of the Bursar, 260 Day Hall (telephone: 607/256-6414).

## Orientation Sessions

Although attendance at orientation sessions is not required, the Office of Financial Aid strongly recommends that all new undergraduate recipients of aid and their parents attend the financial aid orientation session included in the Cornell orientation program. The orientation schedule should be consulted for dates and times of the session.

## Money Management

Some students have difficulty managing their resources to meet expenses. Students should plan for their expenses carefully, using the cost-of-attendance figures in the brochure as a guide. Brochures are available describing housing on and off campus and dining plans.

The consequences of not paying University bills are severe. A student may not register for a new term until all charges are paid for preceding terms.

Degrees will not be conferred and transcripts will not be sent until all University charges, including Cornellcard, are paid.

## Financial Counseling Services

Financial Aid Information Resources is a group of work-study students. These peer counselors can answer financial aid questions and give advice on financial aid problems. To contact a student counselor, students should come to the Office of Financial Aid.

If students have any questions about financial aid or need assistance in budgeting, they should contact the Office of Financial Aid, Cornell University, 203 Day Hall, Ithaca, New York 14853.

## Statement of Student Rights and Responsibilities

- 1) Students have the right to be informed of, and to apply for, all financial aid programs for which they are eligible, and have the responsibility to apply by program deadlines and to acquaint themselves with the application procedure.
- 2) Students have the right to know how financial need and award packages will be determined and to request a review of the financial aid package should circumstances change to negatively affect the family's ability to meet costs of attendance, and have the responsibility to notify the University should new resources become available to the student that were not originally considered.
- 3) Students who borrow from the University have a right to full disclosure of the terms and provisions of loan programs, including typical repayment schedules, and have the responsibility to attend preloan and exit interviews before borrowing and leaving the University. They must repay loans on a timely basis and keep the University informed of their current address.
- 4) Students have the right to be informed of financial aid policies and have the responsibility to be aware of all published financial aid policies and to comply with these policies.
- 5) Students have the responsibility to submit accurate information on all University documents relating to the financial aid application process.

## New York State College of Agriculture and Life Sciences

### Administration

David L. Call, dean  
Kenneth E. Wing, associate dean  
George J. Conneman, director of instruction  
Helen L. Wardeberg, associate director of instruction  
Theodore L. Hullar, director of research and director of the New York State Agricultural Experiment Station (Ithaca)  
Lamartine F. Hood, associate director of research  
James J. Zuiches, associate director of research  
Lucinda A. Noble, director of cooperative extension  
David T. Smith, associate director of cooperative extension  
Edwin B. Oyer, director of international agriculture

### Office of Instruction Staff

Student services: Donald Burgett, Eunice Paddio-Reed  
Minority affairs: Cathy Thompson  
Records: Tom Wakula  
Registrar: Ruth Stanton  
Scheduling: Cathy Place  
Admissions: Richard Church, Mary Grainger, Nancy Rehkugler  
Career development: William Alberta

### Department Chairmen

Agricultural economics: O.D. Forker, Warren Hall  
Agricultural engineering: N. R. Scott, Riley-Robb Hall  
Agronomy: R. F. Lucey, Emerson Hall  
Animal science: R. J. Young, Morrison Hall  
Communication arts: D. F. Schwartz, Roberts Hall  
Education: J. P. Bail, Stone Hall  
Entomology: M. J. Tauber, Comstock Hall  
Floriculture and ornamental horticulture: C. F. Gortzig, Plant Sciences Building  
Food science: J. E. Kinsella, Stocking Hall  
Microbiology: R. P. Mortlock, Stocking Hall  
Natural resources: R. T. Oglesby, Fernow Hall  
Plant breeding and biometry: W. D. Pardee, Emerson Hall  
Plant pathology: W. E. Fry, Plant Sciences Building  
Pomology: G. H. Oberly, Plant Sciences Building  
Poultry and avian sciences: R. C. Baker, Rice Hall  
Rural sociology: E. C. Erickson, Warren Hall  
Statistics and biometry: W. T. Federer, Warren Hall  
Vegetable crops: E. E. Ewing, Plant Sciences Building

### Facilities

The College of Agriculture and Life Sciences (CALS) 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 and is commonly known as the Ag Quad. Anchored on the East by Mann Library, the quadrangle buildings house classrooms, offices, and laboratories and are flanked by greenhouses, gardens, and research facilities. Nearby are the orchards, barns, field plots, forests, and streams that extend as far as the Animal Science Teaching Research Center at Harford and the Experiment Station at Geneva.

Administrative units, including the dean's office and the Office of Instruction, are located in Roberts Hall. Information about academic programs, student records, graduation requirements, career planning, financial aid, placement, and counseling may be

obtained there. The student lounge and service center of the college is in the Alfalfa Room, across the Ag Quad in Warren Hall. Computer facilities are available in 160 Warren Hall and in 15A Riley-Robb.

### Advising and Counseling Services

Faculty in the College of Agriculture and Life Sciences recognize that students need information and advice to make intelligent decisions while in college. Each student is assigned to a faculty adviser soon after being admitted to the college. An effort is made to match the student's and the faculty member's interests as closely as possible.

**The Office of Student Services** has overall responsibility for coordinating the college advising and academic counseling program. Inquiries regarding procedures and services should be directed to Dr. Donald Burgett, 17 Roberts Hall (telephone: 256-2257). Students may change advisers if their academic interests change or if they feel their needs can be better served. Change of Adviser forms are available from this office. The minority students in the College of Agriculture and Life Sciences, in conjunction with the University-wide COSEP program, 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 New York State Education Department. Students in the College of Agriculture and Life Sciences who are eligible should apply to the program. Forms are available in 17 Roberts Hall (telephone: 256-6588).

**The Office of Career Development** offers a variety of services to all students and alumni of the college. For further information, students should contact William Alberta (telephone: 256-2215).

**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.

The progress of each student toward meeting the degree requirements is recorded in the College Registrar's office on a Summary of Record form. Worksheets are available on which students can keep their own record of courses taken toward meeting the distribution and elective requirements. Data on the worksheets can be used by the student in planning course selection each term to assure reasonable progress toward meeting degree requirements.

Staff members are available in 192 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.

### Financial Aid

Financial aid is administered through the University office in Day Hall. Endowment funds and annual donations provide supplemental aid for students in the college. Awards recommended by the College Scholarship Committee become part of the total financial package offered through the University's Office of Financial Aid.

A small loan fund is administered by the college through the Office of Instruction. The purpose of the fund is to assist students facing short-term emergencies. The loans are interest free and are usually made for no more than ninety days. For information, students may contact the Office of Instruction at 256-4569 or 256-2257.

### Students

The CALS undergraduate enrollment is 3000, with about 60 percent in the upper division. Each year about 850 students are graduated, while 600 freshmen and 250 transfer students are admitted. Over 300 faculty members serve as advisers for undergraduates. About 1000 graduate students have members of the faculty of the college who serve as chairmen of their Special Committees.

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 about 15 percent come from other parts of the United States or abroad. Nearly half of the undergraduates are women. About 7 percent are identified as members of minority-ethnic groups.

### Transfer Students

Any student who has withdrawn from one college and has been accepted in CALS is considered a transfer student. Approximately 20 percent of the undergraduate students are transfers who have taken part of their collegiate work at community colleges, agricultural and technical colleges, or other two-year institutions. Many of these hold an Associate degree. Other transfer students, including those from other colleges at Cornell, may also be admitted.

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, 195 Roberts Hall. The procedure includes filing a transfer request in the Office of the University Registrar, 222 Day Hall, 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, students may transfer directly into CALS. In other cases, the student may be referred to the Division of Unclassified Students 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 an outline of the courses they want to take. For more information, students should contact the Admissions Office, 195 Roberts Hall (telephone: 256-2036).

### Part-Time Study

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 Center, 103 Barnes Hall, provides information, counseling, and special programs for mature students throughout the University (telephone: 256-4987).

## Degree Programs

Field of Study	HEGIS Code	Department Chairman	Undergraduate Coordinator	Graduate Faculty Representative
<i>Agricultural Economics</i>	0111	O. Forker	D. Goodrich	R. Boisvert
Business Management and Marketing	0112			
Farm Finance and Management	0110			
Food Industry Management	0113			
<i>Agricultural Engineering**</i>	0903	N. Scott	D. Ludington	G. Rehkugler
Agricultural Engineering Technology	0925			
Environmental Technology	0199			
<i>Agronomy*</i>		R. Lucey		J. Duxbury
Meteorology	1913		W. Knapp	
Crops	0102		G. Fick	
Soils	0103		D. Lathwell	
<i>Animal Science**</i>	0104	R. Young	J. Stouffer	R. Quass
Animal Breeding*				D. VanVleck
<i>Biological Sciences (Div. of)</i>		R. Barker, dir.		
Biology, General	0401		H. Stinson	
Biochemistry**	0414			K. Moffat
Botany/Plant Biology**	0402			P. Davies
Ecology and Systematics**	0420			P. Marks
Genetics and Development**	0422			S. Zahhler
Neurobiology and Behavior**	0425			R. Hoy
Physiology**	0410			R. Wasserman
<i>Communication arts**</i>	0601	D. Schwartz	D. Schwartz	N. Awa
<i>Education**</i>	0801	J. Bail	G. Posner	J. Novak
Agricultural Education†	0899		W. Drake	
<i>Entomology**</i>	0421	M. Tauber	E. Raffensperger	W. Tingey
<i>Floriculture and Ornamental Horticulture**</i>	0109	C. Gortzig	K. Mudge	R. Langhans
Landscape Architecture**†	0204		M. Adlemnan	L. Mirin
<i>Food Science**</i>	0113	J. Kinsella	J. Sherbon	R. Ledford
General Studies in Agriculture	0101		D. Burgett	
International Agriculture**	0101		L. Zuidema	E. Oyer
<i>Microbiology**</i>	0411	R. Mortlock	P. VanDemark	P. VanDemark
<i>Natural Resources**</i>	0115	R. Oglesby	R. Morrow	W. Youngs
Aquatic Science	0107		R. Oglesby	
Nutrition* (Div. Nutr. Sci.)		M. Nesheim, dir.	M. Devine	L. Wright
Plant Sciences, General	0106		L. Topoleski	
Plant Breeding**	0116	W. Pardee	C. Lowe	V. Gracen
Plant Pathology**	0404	W. Fry	J. Lorbeer	M. Zaitlin
Plant Protection**	0108		P. Arneson	P. Arneson
Pomology**	0108	G. Oberly		F. Liu
Vegetable Crops**	0108	E. Ewing	W. Kelly	P. Minotti
<i>Rural Sociology</i>	2208	E. Erickson	E. Erickson	F. Young
Development Sociology*				
<i>Statistics and Biometry**</i>	0419	W. Federer	S. Searle	W. Federer

\* = Graduate Only

\*\* = Graduate and undergraduate

† = Certificate/license

## 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 degrees as well as several professional degrees, including the Master of Professional Studies and the Master of Arts in Teaching, and some registered professional licensing or certification programs.

Graduate study is organized under graduate fields, which generally coincide with the department. Graduate degree requirements are described in the *Announcement of the Graduate School*. Degree programs offered in the college are listed below.

## The Bachelor of Science Degree

To qualify for the Bachelor of Science degree, students must fulfill requirements established by the faculty of the College of Agriculture and Life Sciences and administered through the Office of Instruction.

## Summary of Basic College Requirements for Graduation

**1. Minimum number of credit hours:** 120. A minimum of 100 credits with letter grades; a minimum of 45 credits in CALS courses.

**2. Residence:** Eight full-time terms of residence are normally required to complete the program of study. Students may graduate in less than eight semesters if all of the requirements for the degree are met.

A maximum of 15 credits per semester may be transferred for full-time attendance at another college, but at least 60 credits must be taken at Cornell. The intra-University transfer student must

complete a minimum of two semesters in CALS and complete 30 credits, at least 20 of which must be earned in courses taught in CALS.

A student must enroll for and satisfactorily complete a minimum of 12 credits per term to remain in good standing. The typical program is 15 credits per term for eight semesters.

**3. Distribution:** 45 credits. A minimum of 9 credits are to be selected in each of the following four groups, plus 9 credits to be selected from any combination of these 4 groups for a total of 45. All courses must be taken for a letter grade.

## Group A: Physical Sciences

Select at least two subjects, including 6 credits in one of the first three areas:

- Chemistry
- Mathematics: includes ALS 115; excludes Mathematics 109

- c. Physics: except 201–205
- d. Other: Agricultural Engineering 208–209; Astronomy 101–102; 103–104; Agronomy 101; Geology: 100 level only

### Group B: Biological Sciences

Select at least two subjects, including 6 credits in the first area:

- a. Introductory biological science
- b. Any course in the Division of Biological Sciences except Biological Sciences 108, 201–202, 205–206, 301–302
- c. Other: Animal Sciences 200, 220, 221; Chemistry 251–253, 357–358; Entomology 212; Microbiology except Microbiology 100; Plant Breeding 225; Plant Pathology 300, 301, 309

### Group C: Social Sciences and Humanities

Select 100-, 200-, or 300-level courses in at least two subjects. A list of courses in various subjects approved by the faculty is available in 192 Roberts Hall

- a. Social sciences: anthropology, economics, government, history, psychology, sociology
- b. Humanities: art, languages, literature, music, philosophy, theater

### Group D: Written and Oral Expression

Select at least 6 credits in written expression and one course in either oral or written expression.

- a. Freshman Seminars
- b. Africana Studies 137–138
- c. Communication Arts 114; 301–302; 360, 363, 365
- d. Education 403
- e. English 280, 281, 285, 288, 289

The basic competencies and skills needed for the various courses of study are usually acquired through selected courses that fulfill the distribution requirements. Student should consult with their faculty adviser to be sure necessary prerequisite courses are selected for the specialization. Generally speaking, the distribution requirements should be largely completed in the first two years of study, with courses in the specialization being concentrated in the upper division.

**4. Mathematics:** A minimum competency in the fundamentals of mathematics is a requisite to satisfactory pursuit of a degree. Hence, the faculty of the college requires that all CALS students complete, with a passing grade, one course in mathematics as part of the Physical Sciences, Group A, distribution requirement. Advanced placement credit in mathematics or transfer credit in a college calculus course may be presented to meet the requirement in Group A.

- a. The CALS Mathematics Placement Test index score is used to determine competency and help students select appropriate college mathematics courses. The test is administered just prior to registration each semester.

All entering undergraduates except those presenting advanced placement credit or transfer credit in college calculus are required to take the placement test. The test may not be repeated by any student. The placement test consists of fifty questions sampled from arithmetic, algebra, geometry, trigonometry, and a smattering of calculus. The index score is determined by the number of correct answers minus one quarter of the number of incorrect answers.

If a high index score (currently equal to or greater than 30) is attained, the mathematics requirement in group A is waived. If a low index score (currently equal to or less than 12) is attained, the student should enroll in ALS 005 before selecting a mathematics course for Group A.

- b. When presenting mathematics transfer credit in Group A, the student may
  1. include precalculus credits along with the calculus credits
  2. transfer up to 6 credits, if the index score is 30 or above
  3. not transfer any credit to Group A, if the index score is from 13 to 30. (Credit may, however, be counted toward graduation.)
  4. not transfer any credit in mathematics, if the index score is below 13

The mathematics requirement should be completed at least by the end of the sophomore year or, for transfer students, by the end of the first year in residence. It is the responsibility of the student to plan a program of study in consultation with the faculty adviser that meets the college requirement in mathematics and that will provide adequate prerequisites in the area of specialization.

**5. Electives:** 75 credits. A minimum of 45 credits must be selected from courses offered in CALS, and another 10 credits must be in the statutory units, including CALS. Electives should be used to meet requirements of the program area and specialization. Core and sequence courses for the various programs of study are described on pages 31–36. The remaining 20 credits needed to complete the graduation requirements may be taken in any college, including CALS. Students who exceed 20 credits in the endowed division will be charged excess tuition at the set rate per credit (currently \$210).

**6. Grade-point average (GPA):** A cumulative GPA and last-term average of 1.7 or above must be maintained. Only grades earned at Cornell and while registered in CALS are included in the cumulative average. To graduate in fewer than eight terms, a cumulative average of at least 2.0 is required.

**7. Physical Education:** Completion of the University requirement (see p. 23). The credit received for physical education does not count toward the 120 hours required for graduation. Transfer students receive credit towards this requirement for as many terms as they have been enrolled full time in another institution. Requests for postponement or exemption should be made in writing to the University Faculty Committee on Physical Education. Questions should be referred to Mr. Alan Gantert, Teagle Hall (telephone: 256-4286).

Students who have been in residence for eight semesters and who have met the graduation requirements will be graduated. Students are entitled to the full eight semesters even though they may have completed the graduation requirements. A student who wishes to continue study after graduation must apply for admission as a special student.

## Academic Procedures and Policies

Procedures for University registration and course enrollment are described on page 20. To enroll in courses, CALS students pick up materials from the Scheduling Office, 192 Roberts Hall, plan a schedule of courses in consultation with their adviser, and return the completed forms to the Scheduling Office for verification and processing by the University computer system. Selection of specific laboratory or discussion sections must be verified in the Scheduling Office; class lists are generated on the basis of the properly filed course enrollment forms.

Three schedule cards—one for the student, one for the adviser, and one for the Scheduling Office—should be prepared.

**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.

To enroll in courses that involve independent study, teaching, or research, the student must complete an *Independent Study Statement*, available in 192 Roberts Hall, and submit it with the course schedule. Students who will be studying off campus should file the *Intent to Study Off Campus* form with the college registrar to ensure that proper registration will occur.

All students should construct a schedule that is appropriate and shows progress toward completing their specialization as well as the graduation requirements.

## Off-Campus Study

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.

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. An *Intent to Study Off Campus* form is available from the College Registrar in 192 Roberts Hall. All students intending to receive Cornell credit for work done off campus should file this form with the college registrar at the time of enrolling for courses to ensure that proper registration will occur. In some programs, adjustment in tuition is made to compensate for the reduced use of on-campus facilities.

Students who plan to enroll in courses at another institution in the United States or abroad, including those participating in the exchange program, petition to register for study in absentia. The petition form is available in 17 Roberts Hall. The course of study that will be undertaken should be planned in consultation with the adviser to assure that the study is appropriate to the student's academic program. Approval of the petition by the Committee on Academic Achievement and Petitions guarantees acceptance of transfer credit as long as the grades received are equivalent to C or better. A maximum of 15 credits per term may be transferred for study in absentia.

## Course Changes (Add/Drop/Change)

Students are held for and receive a grade for those courses for which they enroll *unless they officially change such enrollment*. All changes in courses or credit hours or grading option must be made by the student at the Scheduling Office, 192 Roberts Hall, on an official form provided for that purpose. When a student submits a properly signed course change form, the change is made on the official class lists by the Scheduling Office.

An official add/drop/change period is designated each term on the University calendar. CALS students may add courses during the first three weeks of the term and may drop courses until the end of the sixth week, after consultation and with approval of the adviser, by filing the properly signed forms in the Scheduling Office. Signatures are required to add or to drop a course.

Beginning with the seventh week of the semester, CALS students wishing to withdraw from a course must petition to the Committee on Academic Achievements and Petitions. A special petition form for course changes is available in 17 Roberts Hall. Requests for course changes are approved only when the members of the committee are convinced that there are unusual circumstances that 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 that time. Failure in a course is not considered an excuse for dropping it. If an illegal schedule results, petitions are generally denied unless very unusual circumstances are present. If the petition to drop the 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.

## Academic Achievement and Progress

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, this committee

- 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;
- reviews, at the end of each semester and at other times as shall seem appropriate to the committee, the progress of all students in meeting academic requirements;
- in case of students not making satisfactory progress, takes appropriate action, including, but not limited to, the following: issuing warnings to students, suspending them, decreeing that they may not reregister, granting them leaves of absence, and allowing them to withdraw;
- 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 and sends a copy of such notice to the student's adviser.

## Academic Deficiency

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

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 each semester, failure to achieve one or more of the following:

- semester GPA of at least 1.7
- cumulative GPA of at least 1.7
- passing 12 or more credits in academic subjects per semester
- reasonable progress toward completion of distribution requirements and all other college and University requirements in eight semesters.

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

## Petitioning Procedures

A student who has grounds to be exempt from a college academic regulation may submit a petition. Petition forms are available in the Office of Student Services, 17 Roberts Hall.

A petition is usually prepared with the assistance of the student's adviser, whose signature is *required* to indicate 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 petitioner* that would warrant an exemption or other action. The adviser and the student are notified in writing of the committee decision.

## 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 Office of Admissions.

## Graduation

The student who completes requirements for the degree will be graduated. In preparation for graduation the student should complete the Candidacy for Baccalaureate Degree form in the College Registrar's Office. Diplomas are prepared by the Office of the University Registrar and distributed by the college registrar to those who have completed the degree requirements and have been approved by the college faculty. A copy of the final transcript, updated to include last-term courses, is mailed to the student by the University without charge.

## Special Academic Opportunities

### 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.

Undergraduates who wish 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 the senior year, on the application form available from the college registrar, 192 Roberts Hall. The college registrar will verify the student's grade-point average and formally enroll the student in the 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.

An honors program is offered in seven subject areas. The programs are described by area.

### Animal Science

Faculty Committee: W. R. Butler, chairman; R. L. Quaas, R. G. Warner

**Program:** Completion of the *honors program in animal science* requires the submission of a written report. This report is to be written in the style of a technical journal with one additional section, "Review of Literature." While it is expected that most students will undertake active research projects, a report totally devoted to review of literature may constitute a suitable project. When the report is submitted to the honors committee, it must be accompanied by supporting letters of evaluation from the faculty supervisor and at least one other faculty member. After reading the reports, the honors committee will interview each candidate regarding his project.

It is expected that the work required for honors will be above and beyond the requirements of any course, including Animal Science 499. However, it is anticipated that many projects may grow out of work initiated under Animal Science 499 or other courses. Since application to the program must be completed early in the senior year (two semesters prior to graduation), students are encouraged to make prior arrangements with faculty supervisors.

A detailed description of the animal science honors program and its requirements may be obtained from the committee chairman.

### Biological Sciences

Faculty committee: K. Niklas (plant biology), chairman; K. Beyenback (animal physiology and anatomy), P. Hinkle (biochemistry, molecular and cell biology), H. Howland (neurobiology and behavior), D. Pimentel (ecology and systematics), R. Wu (genetics and development), and H. Stinson (associate director), *ex officio*

**Program:** Students will report on their research projects in two seminars and in an honors thesis, which will be evaluated both by the committee and by two other faculty members. The students working in each section of the division will meet as a group during each semester together with the appropriate faculty member or members from the committee. These seminars must be attended by all students in the honors program. Active participation in terms of questions or comments is expected.

The thesis should be written in the form of a research report in a leading journal in the disciplinary area of research. Unless there are unusual circumstances, the thesis should not exceed twenty pages, double-spaced. The student, with guidance of the research supervisor, conducts a thorough literature search on the topic.

Three copies of the thesis need to be submitted to the honors committee by the designated date. The faculty research supervisor must submit an evaluation of the thesis, including judgments on the significance of the problem and of the thesis. The thesis is also reviewed by two anonymous faculty members. A majority vote of the honors committee that the thesis is acceptable is necessary for the recommendation that the student be graduated with honors.

### Entomology

Faculty committee: E. W. Cupp, chairman; C. O. Berg, E. J. Hagedorn, R. A. Morse, D. Pimentel

**Program:** An *honors program in the area of entomology* may be pursued by any qualified student in CALS. 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, 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 library in entomology are also a major asset if one 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 to determine if time and effort can be allotted to such an undertaking.
- Discuss the project with an appropriate faculty member in the area of entomology. (The faculty adviser will be of assistance in determining which faculty entomologist might be the best to approach, the decision being based primarily upon the subject-matter expertise of the available faculty.)
- Prepare a brief, tentative plan for the project for discussion and approval of the honors project adviser. This plan should include a determination of



support needed in such matters as space, equipment, time, and supplies. (CALS provides modest funds in support of projects upon application and submission of a budget proposal.)

- Present a completed application to the chairman of the entomology honors committee no later than the end of the third week of the first semester of the senior year.
- Submit a brief progress report, approved by the project adviser, to the entomology honors committee by midterm of the semester in which the student will complete his or her graduation requirements.
- Present a final project report, which is approved by the faculty honors project adviser, to the chairman of the entomology area honors committee no later than the last day of classes in the semester in which the student anticipates graduation.

### Natural Resources

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

Program: 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, 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 or expertise in the problem area chosen.

In addition to meeting requirements of the college, we expect the student to do the following:

- Register for the honors program in the junior year.
- 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 our theses have been published.
- Work closely with at least two faculty or staff 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.

### Physical Science

Faculty committee: W. F. Shipe, chairman; D. A. Haith, D. J. Lathwell

Program: The *honors program in physical science* provides outstanding students with an opportunity to do independent research under the supervision of a faculty member in the Departments of Agricultural Engineering, Agronomy, and Food Science. Students must be enrolled in the program for a minimum of two semesters. They must also enroll in the appropriate departmental independent study course for a total of at least 6 credits.

Students 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 chairman of the physical science honors committee.

### Plant Sciences

Faculty committee: E. A. Delwiche, chairman; C. C. Lowe, R. L. Obendorf, W. C. Kelly, R. P. Kort

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 chairman of the honors committee.

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 should be accompanied by a letter of

recommendation from the supervisor of the research, that letter reflecting the supervisor's familiarity with the research, 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 chairman will recommend graduation with honors for that student in a letter to the director of instruction.

One copy of the report will be returned to the student; the other will be shelved in Mann Library.

### Social Sciences

Faculty committee: V. Rockcastle, chairman; D. Goodrich, P. Garrett, J. Lawrence

Program: Honors degrees are awarded in the *behavioral and social sciences* upon approval of an honors thesis reporting a piece of original research in an appropriate area.

The research should deal with a substantive issue within one of the fields in the behavioral and 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 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. While work may originate in prior class work, it is expected that honors research will extend it. Students may, however, register for independent study in conjunction with an honors project.

Reports may be written according to the form of any standard journal within the appropriate fields. Three copies of the report should be submitted to the chairperson of the honors committee two weeks prior to the last day of classes of the semester for which the degree is sought. A supporting letter from the faculty member supervising the work must also be submitted. Approval of the thesis requires a majority vote of the honors committee.

### Albany Programs

Three programs in the New York State capital relate career interests to academic and legislative concerns. The Assembly Intern Program provides a placement with a member or 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 Department of Environmental Conservation, Education, or Labor. While in Albany students receive an intensive orientation to state government and attend a lecture-seminar program, composed of three 2-credit components, offered by each program's professor-in-residence.

Applicants are screened by the CALS Internship Committee in the term prior to assignments. Those accepted should plan a program of study in consultation with their faculty adviser during the preenrollment period. Students 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.

To receive academic credit for the internship experience, students enroll in ALS 400, Internship, for a maximum of 6 credits, S-U grades only. General supervision of the internship is provided by the CALS Internship Committee.

Independent study and research courses offered by the various departments in CALS and/or courses offered by academic institutions in the Albany area may be elected to complete a full course of study for the term.

The Intent to Study off Campus form should be filed with the college registrar at the time of preenrollment for courses. Tuition is prorated for off-campus study; stipends to help defray living expenses are provided in each program. Students receiving financial aid should consult with the Office of Financial Aid prior to leaving campus.

None of the credits earned in the Albany program may be used to meet CALS distribution requirements; at least 12 credits must be carried to meet the residence requirement. Seniors should note that the last-term average must be 1.7 or above. Normally a faculty member will not sponsor more than one of the independent study courses for any one student.

Information and applications are available in the Career Development Office, 16 Roberts Hall.

### Overseas Academic Programs

Several opportunities for study abroad are coordinated with the College of Agriculture and Life Sciences. These opportunities offer students a broadened educational program, a multicultural perspective, and possible new avenues of career development. Among the available study-abroad programs are two student exchange programs with universities in Mexico and Sweden. Cooperative arrangements with the University of Reading in England and the University of Dublin in Ireland have enabled the college to endorse several students for a year of study under a tutor in those schools.

*Students in the exchange programs must petition for registration in absentia.* Credit received for academic work at any of these schools may then be transferred to meet requirements for graduation at Cornell in the normal time period. Students interested in these or other year-abroad programs may obtain additional information from the Office of Student Affairs.

**Mexican exchange program.** Two students from the college are competitively selected in the freshman year to go to the Instituto Tecnológico y de Estudios Superiores de Monterrey during the junior year. The sophomore year is used to attain proficiency in the Spanish language. Two students from Monterrey attend Cornell University under similar arrangements each year.

**Swedish exchange program.** The student selected to participate in the Swedish exchange program applies for it in the sophomore year and spends the junior year at the Agricultural College of Sweden 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 the Agricultural College in Uppsala spends a year at Cornell University, partially supported by the college and student groups here.

**Year abroad in England.** The college has an arrangement with the University of Reading whereby a few students are recommended to the faculty for admission for one year as occasional students. Students go in their junior year. All expenses are paid by the student, but total costs (including transportation) have been less than at Cornell.

**Year abroad in Ireland.** For college students with majors in the biological sciences or related areas, a special year-abroad program has been established with the University of Dublin (Trinity College) in Ireland. A small number of Cornell students in genetics, microbiology, and biochemistry participate in the program each year. The program is similar to the Reading program with respect to finances.

## Major Fields of Study

The college curriculum emphasizes the biological and physical sciences and the technology basic to the study of agriculture and the life sciences. The variety of programs offered is in keeping with its mission "to increase our understanding of natural processes in the areas of agricultural sciences, biology, and the use of natural resources and the environment; to educate citizens for activity and leadership in these areas; and to translate new knowledge into action for the well-being of the people, their agriculture, their resources, and the communities in which they live."

Every curriculum creditable toward a degree in the college is registered with the State Education Board and is linked with the national Higher Education General Information Survey (HEGIS) codes for federal and state reporting. Graduate study is organized by fields, which may draw faculty from several disciplines and departments in the colleges of the University. Major and minor subjects offered in each field are described in the *Announcement of the Graduate School*.

In 1973, to facilitate the student's choice of a major field of study, the many undergraduate options and specializations offered by CALS were organized into eight broad but relatively homogeneous program areas: agricultural and biological engineering, animal science, applied economics and business management, behavioral and social sciences, biological sciences, environmental studies, food science, and plant sciences. A ninth area includes a cluster of special programs.

Faculty curriculum committees in each program area identify a core or sequence of courses appropriate to all students in that field. The program area may be based in one department, or faculty from several departments may constitute the committee planning the sequence.

The program areas reflect the major academic effort in the college. Within each area, courses of study are designed to provide systematic development of basic skills and concepts and the opportunity for specialization in an area of particular interest to the student.

Programs are planned with considerable flexibility, allowing students to prepare for careers, further 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. Specific requirements are detailed in each program area.

### Agricultural and Biological Engineering

Agricultural and biological engineering links technology and engineering with the biological, social, and agricultural sciences. It is the branch of engineering that serves agriculture, directly concerned with the means for providing food and fiber to fill the basic needs of all people. The challenge in agricultural engineering is to develop systems that increase production of food while maintaining the quality of the environment and minimizing energy use.

Students study topics such as machinery, soil and water conservation, waste management, power and energy, structures and building design, bioengineering, community development, food engineering, construction and design of secondary roads, the teaching of agricultural mechanization, and environmental-quality control.

The program is offered by the Department of Agricultural Engineering. It is housed in Riley-Robb Hall, which has one of the most complete agricultural engineering facilities in the United States.

**Agricultural engineering** is intended for the student who is particularly interested in the theoretical and fundamental aspects of engineering required for design and research. The student must have a strong aptitude for mathematics and physical sciences and high motivation. Biological, social, and agricultural sciences are integrated in this specialization, but the physical sciences predominate. The specialization is jointly sponsored by the New York State College of Agriculture and Life Sciences and the College of Engineering. The curriculum, described in the College of Engineering section, is accredited by the Engineer's Council for Professional Development. Students double register in both colleges during their junior and senior years. The agricultural engineering specialization provides excellent preparation for a wide variety of jobs in most industries that serve agriculture. Qualified graduates may also continue study in a Master of Engineering, Master of Science, or doctoral degree program.

**Agricultural engineering technology** offers the student opportunities to take courses in such areas as agronomy, agricultural economics, natural resources, and animal science as well as in plant physiology, food science, genetics, and microbiology. The emphasis is on technical aspects of the production of food, feed, and fiber.

Some of the interest areas offered are the teaching of agricultural mechanization, power and machinery, soil and water management, and structures and the environment. Students may also prepare for work in cooperative extension.

Specific course requirements for agricultural engineering technology are:

A. Basic Subjects	Hours
1. Mathematics, including one semester of calculus	6
2. Chemistry	6
3. Physical Sciences	
a) Physics (if no previous high school physics)	8
b) Application of physical sciences (Ag Eng 208, 209)	6
4. Oral communication	3
5. Technical skills	
a) Computer programming	3
b) Graphics	3
c) Surveying	3
d) Metal work or carpentry	2
B. Advanced and Applied Subjects	
1. Agricultural sciences	
a) Soils	4
b) Animal production	3
c) Plant production	3
d) Farm or business management	3
2. Five agricultural engineering courses at the 300 level or above	15

**Environmental technology** is directed toward students with applied science and mathematical interests who have concern for the quality of the environment and a desire to deal with environmental-quality management problems from a technological perspective. The specialization combines basic training in physical and biological sciences, ecology, and environmental quality with a selection of courses oriented toward technical problem solving. A graduate from this area of specialization should have the ability to work with scientists and engineers in industry and governmental agencies on environmental planning, environmental impact studies, and pollution control or in sales, development, and research.

Specific course requirements for environmental technology are:

A. Basic Subjects	Hours
1. Calculus (Math 111, 112, and if graduate study is proposed, Math 214, 215, 216, 218)	6-10
2. Chemistry	6-8

3. Physics	8
4. Computer programming	3
5. Microeconomics	3
6. Introductory environmental sciences	
a) Soil science	4
b) Natural resources	3
c) Microbiology	3
d) Ecology	3

B. Advanced and Applied Subjects	Hours
1. Technology	
a) Hydrology (Ag Eng 371)	2
b) Environmental pollution (Ag Eng 325)	3
c) Environmental systems analysis (Ag Eng 475)	3
2. Environmental sciences: three courses selected from biochemistry, limnology, microbiology, natural resources, soil and water conservation, or atmospheric sciences	9
3. Social sciences: two courses selected from economics, government, law, or sociology	6
4. Environmental engineering: two engineering waste management courses at the 450 level or above	6

### Animal Sciences

Students in this program area study the breeding, care, and production of dairy and beef cattle, horses, poultry, pigs, and sheep. Basic and biological sciences are applied to animal industries to increase the supply of food and other products by animals. The animal science program is offered jointly by the Departments of Animal Science and Poultry Science. It is housed in Morrison Hall with some facilities also in Rice Hall. The Animal Research and Teaching Center is located at Harford, New York.

Production courses are designed to provide some practical experience in animal production. Many species of animals are used for study and research, including dairy and beef cattle, horses, sheep, swine, chickens, turkey, ducks, mink, dogs, rabbits, rats, hamsters, guinea pigs, goats, and turtles. The program has excellent facilities for housing animals and modern, well-equipped laboratories and classrooms.

Students enroll in other basic and applied courses and, with their advisers, develop a curriculum that may include courses in animal nutrition; animal breeding and genetics; animal physiology; meat science; and dairy cattle, livestock, and poultry production. Students who want to enter veterinary college or graduate school take additional courses in chemistry, physics, biochemistry, microbiology, and mathematics.

Students can specialize in dairy, poultry, and livestock production; animal breeding and genetics; meat science; animal physiology; and animal nutrition. In consultation with their advisers students may select sequences of courses tailored to their own interests. Students may prepare for careers in animal production or as technicians. Students whose interests and abilities warrant it are usually urged to emphasize the basic physical and biological sciences. This emphasis provides preparation for graduate study, admission to veterinary college, or careers in teaching or research in the more specialized disciplines of animal science.

Students are required to complete a minimum of 25 credits in animal science. This includes 12 credits in basic courses, 6 credits in animal or poultry production, and 6 credits in advanced courses. Work experience is highly recommended.

Students preparing for graduate or advanced professional work in animal science should take upper-division courses in chemistry and biochemistry as well as animal science courses in cytogenetics or animal breeding, forages, meats, swine or sheep, dairy cattle, artificial insemination, lactation, nutrition, and endocrinology.

## Applied Economics and Business Management

In applied economics and business management, students may choose several specializations and options. Courses in agricultural economics are supplemented with others in related areas such as economics, sociology, history, government, industrial and labor relations, hotel administration, consumer economics, animal science, plant sciences, natural resources, mathematics, and statistics.

Students with outstanding academic records may apply to coregister in the Graduate School of Business and Public Administration in their senior year. For information, students may contact the Admissions Office, 315 Malott Hall.

The program in applied economics and business management is based in the Department of Agricultural Economics and housed in Warren Hall. Agricultural economics provides a general program in the economics of the agricultural sector. It is an appropriate major for those students who want (1) to survey offerings in agricultural economics, such as management, marketing, economic development, and policy and resource economics; and (2) to prepare for graduate work in agricultural economics.

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, and production management are fields for which students may prepare.

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, and 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.

Resource economics is an option for students interested in the application of the principles of economics to problems, both public and private, involving natural and human resources. Public affairs management integrates a wide range of subject areas designed to familiarize students with the nature of public affairs and managerial complexities created by the interaction of economic factors in social and political institutions.

The program includes six core courses in the Department of Agricultural Economics and additional courses in an optional area of concentration.

## Behavioral and Social Sciences

The behavioral and social sciences (BASS) are concerned with people, their society, and their environment. Knowledge developed in agriculture and life sciences is translated into programs affecting people and the environment in which they live and work, stressing the application of concepts to real-life situations.

The program is offered by three departments in the College—Communication Arts in Roberts Hall and Mann Hall; Education, in Stone Hall; and Rural Sociology, in Warren Hall.

### Communication arts

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 Arts study communication theory and practice. As a result, they learn both the social science underlying communication and the most effective means of adapting written, interpersonal, audio, and visual communication to their audiences.

Students elect one of three different sequences by the beginning of their junior year: public communication, publication, or interpersonal communication. Each sequence has a required core of five to seven courses, all of which include Writing for the Mass Media, Theories of Human Communication, Introduction to Mass Media, and Oral Communication.

To prepare students for a career in a general area such as business, government, educational, or public service communication, or for a specific profession such as agribusiness, public relations, or science journalism, a concentration of at least 12 credits outside the department is required. This may be all in a single department or may be related courses in several departments. The concentration allows students to plan for an initial career field or type of position.

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

**Public communication** prepares students for careers as communication, information, or public relations specialists in a wide variety of settings. This would include agriculture, business, education, government, and community and social welfare organizations.

Required courses for this sequence are taken in communication planning and strategy, survey research, communication in organizations, and visual communication. In addition, there is a heavy emphasis on writing skills.

**Publication** provides an excellent background in writing for a variety of markets. Students can select courses to provide them with skills as editors and writers in virtually any field, e.g., agricultural journalist, editor for organizational publications, science or technical writer.

Required courses for this sequence are taken in writing, media law, publication design, and communication theory. In addition, students serve as staff members for the *Cornell Countryman* for one or two terms.

**Interpersonal communication** coupled with a carefully designed concentration prepares students for careers in human service professions such as personnel administration, training, and a variety of sales and consulting positions. The sequence also prepares one for graduate study in communication and the allied social sciences.

Required courses for this sequence are taken in communication theory, survey research, and writing. Electives include such courses as small-group communication, listening, persuasion, intercultural communication, and organizational communication.

Detailed descriptions of the sequences and the guidelines for the selection of elective courses are available from the Department of Communication Arts, 307 Roberts 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 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 changes in educational programs in an

effort to increase understanding of the substance and process of education so that human potentialities can be realized.

**Agricultural education** is intended for students who have good academic ability, experience in agriculture, and an interest in youth and young adults who would like to study agriculture. The ability to work and get along with people is essential. This is the only program in New York State leading to certification to teach agriculture in public schools. The agricultural subjects are agricultural business, agricultural mechanization, conservation, farm production and management, horse handling and care, ornamental horticulture, and small animal science. Candidates must complete an approved curriculum leading to the baccalaureate degree, including a supervised teaching experience. During their sophomore year, students who are interested should consult Professor W. Drake, 212 Stone Hall, for technical and pedagogical requirements. Permanent certification requires graduate study.

Also available is a program that does not provide teacher certification. Students completing this specialization often find positions in businesses or industries conducting education programs. Some may enter fifth-year teacher-preparation programs.

**Education.** Students, in consultation with an adviser, plan a program that includes:

- One introductory course, either The Art of Teaching, or Educational Studies. Two courses selected from educational psychology, sociology of education, and general, political, or social philosophy of education.
- Field experience under the direct supervision of the student's adviser (or some other supervisor).
- Twelve to 15 credits of electives chosen from upper-division courses in education. These courses allow students to concentrate on a particular area or pursue special interests.

By selecting a science, mathematics, or environmental education sequence, students prepare for positions in environmental centers, museums, school systems, governmental agencies, youth organizations, private conservation organizations, or industrial groups. Each student will take about 50 credits in basic science, including both the biological and the physical sciences.

Students develop competence in communicating to audiences of varying ages in the public relations activities concerned with environmental quality and interpretation, and in transmitting ideas and reports through mass media.

### Rural Sociology

Rural sociology trains students in the theory, methods, and applications of sociology in rural society, both domestic and international. Each student specializes in one of three areas: rural social organization and development, theory and policy, or methods and analysis. Such training provides a basis for sociology-related occupations and prepares undergraduates for more detailed graduate work in a number of rural development fields.

Each student must complete 24 credits of courses in rural sociology and a 3-credit course in statistics. Required rural sociology courses are: 100, Introduction to Sociology, or 101, Introduction to Rural Sociology; 105, Rural Sociology and World Development; 213, Introductory Research Methods; 356, Rural Society in America; and 404, Intermediate Sociological Theory.

## 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.

Areas of concentration include general biology, animal physiology and anatomy; biochemistry; botany; cell biology; ecology, systematics, and

evolution; genetics and development; neurobiology and behavior; and an independent option. Programs of study are described under the Division of Biological Sciences, pages 221–223.

## Microbiology

Microbiology is a specialization based in the College of Agriculture and Life Sciences. The program provides training for technical positions in microbiology or preparation for graduate work in theoretical and applied microbiology.

Students may prepare for career options such as food microbiology or pharmaceutical and industrial microbiology, or pursue preprofessional veterinary, medical, and dental programs.

For a limited number of students who are selected for the clinical microbiology specialization, the senior year may be spent at Cornell Medical College and the New York Hospital or at another affiliate.

The course of study requires concurrent course work in chemistry, physics, and mathematics and is designed to fulfill the requirements for accreditation by the American Academy of Microbiology. Most students specializing in microbiology elect additional courses in the College of Veterinary Medicine. More information may be obtained from the Department of Microbiology, Stocking Hall.

## Nutritional Sciences

The Division of Nutritional Sciences is an intercollege unit affiliated with the College of Human Ecology and the College of Agriculture and Life Sciences. Most students are admitted to the undergraduate nutrition major through the College of Human Ecology. Students in the College of Agriculture and Life Sciences who want to pursue a nutrition emphasis may plan a concentration in Biological Sciences, Option 8, or in General Studies in Agriculture. Other studies in CALS closely related to nutritional sciences include food science, food-industry management, animal sciences and nutrition, vegetable crops, and microbiology. For more information about the curriculum, see Division of Nutritional Sciences, page 334, or consult M. Devine, associate director for academic affairs in the division.

## Environmental Studies

The study of the environment and man's interaction with it is a vigorous and challenging area. The strategy for developing reasonable solutions to environmental problems requires a strong base of scientific, ecological, and technical knowledge; the ability to understand the natural environment; and the ability to estimate the effect of man's interaction with the environment. New tools and techniques borrowed from all areas of science and technology are being applied to the solution of environmental problems. Areas of specialization in environmental studies are the agronomic sciences relating to the atmosphere and to soils, entomology, landscape architecture, and natural resources with emphasis in wildlife, forestry, and aquatic science. The specializations are based in the departments of Agronomy, in Emerson Hall; Entomology, in Comstock Hall; Floriculture and Ornamental Horticulture, in the Plant Sciences Building; and Natural Resources, in Fernow Hall.

## Agronomic Sciences

**Crop science, meteorology, and soil science** are specializations offered by the Department of Agronomy, which is located in Bradfield and Emerson Halls.

**Crop science** is the application of basic biological and ecological concepts to the production and management of field crops. Examples of field crops are alfalfa, corn, soybeans, and wheat. Courses required by all students who specialize in crop science include general biology, botany, plant physiology, general chemistry, mathematics,

computing, crops, and soils. Students who anticipate a career in agricultural production or service after completion of the B.S. degree should take additional courses in crops, soils, crop physiology, economics, communication, plant pathology, entomology, nutrition, genetics, microbiology, and climatology. Students planning graduate or professional study beyond the bachelor's degree should take advanced course work in biochemistry and botany; qualitative, quantitative, and organic chemistry; and calculus, physics, and statistics.

**Meteorology** is the study of the atmosphere and the processes that shape our weather. The core curriculum in meteorology is designed to provide the student with an understanding of the fundamental physical and dynamical properties and processes of the atmosphere. All students in this specialization are required to complete a minimum of three semesters of calculus, two semesters each of chemistry and physics, and a sequence of five courses covering general, theoretical, and synoptic meteorology. Additional courses are available for students interested in subjects of agricultural meteorology, forecasting, and physical meteorology. The core curriculum satisfies the basic educational 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 complimentary 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 16 credits in soil science, including 4 credits in the introductory course and 12 credits chosen from four of the following five areas: soil geography, soil chemistry, soil physics, soil microbiology, and soil fertility. In addition, 10 credits of chemistry, 6 credits of mathematics, and 6 credits of physics, as well as supporting biological sciences courses are expected to satisfy the major.

## Entomology

Entomology offers students an opportunity to adapt their area of specialization to any of a variety of interests. Many students in entomology anticipate graduate training and find a broad range of courses available to them. Others may discover many courses related to entomology in applied agriculture useful for the career they are planning.

Courses in basic and applied subjects are offered. A student emphasizing science takes three entomology courses that provide a general basis for future study: Insect Biology, Insect Morphology, and Introductory Insect Taxonomy. These courses are followed by two or more courses from different areas of emphasis within entomology. At the same time, students are required to build a strong background in the basic sciences.

## Floriculture and Ornamental Horticulture

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

Landscape architecture is a licensed profession in most states. In New York State both the practice of landscape architecture and the use of the title *landscape architect* are restricted by law. Qualifications for licensing include completion of a

specified period of approved professional work experience and passing a comprehensive state licensing examination.

**Bachelor of Science curriculum.** The landscape architecture undergraduate curriculum is a four-year professional program leading to a Bachelor of Science degree. The program is accredited by the American Society of Landscape Architects and by the State Board for Landscape Architecture of the New York State Education Department.

The undergraduate curriculum in landscape architecture centers around a three-year sequence of design studio courses that begins in the fall semester of the sophomore year. Transfer applicants are considered for fall-term admission only. Because of the six-semester design studio requirement, they enter the program at the second-year level. A maximum of 30 credits can be accepted for transfer.

Core courses in conceptual design, plant materials, landscape history and theory, landscape planning, landscape materials and construction, planting design, graphics, and natural sciences are required throughout the four-year curriculum. Studio courses deal with the application of design methods and principles that reflect knowledge and appreciation of land, water, plants, and the built environment in planning and designing land areas for public and private use. Basic to the curriculum is concern for the creation of environments that meet complex social needs and are ecologically sound and aesthetically pleasing. An option for study abroad in Denmark is incorporated into the spring semester of the junior year.

Requirements for specialization in landscape architecture include satisfactory completion of the 69-credit core curriculum and an approved summer internship.

## Curriculum

First Year—Fall Term	Credits
*LA220, Principles of Spatial Design	3
†Arch 141, History of Architecture I	3
†Bio S 109, Biology for Nonmajors	3
†Freshman humanities elective	3
†Distribution elective in mathematics	3
	15
First Year—Spring Term	
†Arch 141, History of Architecture II	3
†Bio S 110, Biology for Nonmajors	3
†Geol 101, Introduction to Geological Sciences	3
†Freshman humanities elective	3
†Distribution elective in mathematics	3
	15
Second Year—Fall Term	
*LA 201, Studio: Design Fundamentals	6
*LA 205, Graphic Communication I	3
†Bio S 260, Introductory Ecology	3
‡CRP 462, The American Planning Tradition	4
	16
Second Year—Spring Term	
*LA 202, Studio: Site Planning	6
*LA 206, Graphic Communication II	3
*LA 224, Plants and Design	3
*LA 310, Site Construction I	4
	16
Third Year—Fall Term	
*LA 301–302, Studio: Regional Landscape Planning, and/or LA 303–304, Studio: Urban Design	6
*LA 311, Site Construction II	4
*LA 521, History of Landscape Architecture I	3
*Flor 313, Woody Plant Materials for Landscape Use	3
	16

*Third Year—Spring Term*

*LA 306, Studio: Interdisciplinary Site-Planning Process	6
*LA 522, History of Landscape Architecture II	3
†C Arts 301, Oral Communication	3
†Distribution elective	3
	15

*Fourth Year—Fall Term*

*LA 401, Studio: Professional Practice	3
*LA 403, Studio: Advanced Site Design	3
*LA 405, Senior Project Seminar	1
*Ag Ec 320, Business Law	3
‡CEE 613, Image Analysis I: Landforms	3
†Distribution elective	3
	16

*Fourth Year—Spring Term*

*LA 406, Studio: Senior Project	6
‡Agr 300, Earth Resources Inventories	3
†Distribution elective	3
†Distribution elective	3
	15

*Summary of credit requirements:*

*Specialization requirements	69
†Distribution electives	45
‡Free electives (minimum)	9
	120

**Master of Landscape Architecture (M.L.A.) degree: first professional degree curriculum.** The three-year M.L.A. curriculum is organized to prepare a student for professional practice in landscape architecture and is structured to provide a first professional degree for students with bachelor's degrees in areas other than landscape architecture or architecture.

Through a course sequence intended to develop basic landscape architectural skills and concepts, the three-year curriculum provides opportunities for students from diverse educational backgrounds to become proficient in landscape design, site construction, graphic communication, plant materials, and other related areas necessary to enter the profession fully qualified at the master's level.

Requirements of the three-year M.L.A. curriculum include 90 credits, satisfactory completion of the core curriculum courses, an approved summer internship, and thesis or final project.

**Curriculum***First Year—Fall Term*

*LA 501, Studio: Design Fundamentals	6
*LA 500, Graduate Orientation Seminar	1
*LA 205, Graphic Communication I	3
*LA 220, Principles of Spatial Design	3
*LA 520, Contemporary Issues in Landscape Architecture	2
	15

*First Year—Spring Term*

*LA 502, Studio: Site Planning	6
*LA 206, Graphic Communication II	3
*LA 310, Site Construction I	4
*LA 224, Plants and Design	3
	16

*Second Year—Fall Term*

LA 601—602, Studio: Regional Landscape Planning, or 603—604, Studio: Urban Design (any two to total 6 credits)	6
*LA 311, Site Construction II	4
*LA 521, History of Landscape Architecture I	3
*Flor 313, Woody Plant Materials for Landscape Use	3
	16

*Second Year—Spring Term*

*LA 606, Studio: Interdisciplinary Site Planning	6
*LA 522, History of Landscape Architecture II	3
*LA 634, Landscape Architectural Research	3
‡Agr 300, Earth Resources Inventories	3
	15

*Third Year—Fall Term*

*LA 607, Studio: Professional Practice	3
*LA 609, Studio: Advanced Site Design	3
*LA 621, Summer Internship Seminar	2
‡LA 531, Regional Landscape Planning I	3
‡Ag Ec 320, Business Law	3
‡CEE 613, Image Analysis I: Landforms	3
	17

*Third Year—Spring Term*

*LA 800, Master's Thesis in Landscape Architecture	9
‡Free elective	3
	12

*Summary of credit requirements:*

*Specialization requirements	76
‡Free electives (minimum)	15
	91

**Master of Landscape Architecture (M.L.A.) degree: 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 institution.

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**

This undergraduate curriculum is designed to provide an enduring and broadly applicable education. A liberal education with a strong biological and natural resources base is emphasized. Students are provided an opportunity to understand the world around them and are exposed to ecological concepts that may form a principal basis for their future decisions and training.

The program is based in the Department of Natural Resources and is housed in Fernow Hall. The Arnot Forest Teaching and Research Center, a biological field station laboratory within driving distance of the campus, has facilities for field-oriented courses and workshops and opportunity for in-residence study at the Arnot Camp.

The curriculum helps prepare students for many useful endeavors and can serve as a base for graduate work in many fields. Students are prepared to appreciate and understand their natural environment and man's impact on it. A foundation is developed for the many students who continue with graduate professional training in natural resource conservation, wildlife science, fishery and aquatic sciences, and related resource programs.

Students are encouraged to study in each of the eight learning areas listed below:

1. Understanding basic substrates for life: geology, soils, meteorology, energy, ecology, water resources
2. Understanding natural processes: chemistry, physics, ecology, field biology
3. Understanding how organisms function: biology, physiology, anatomy, behavior
4. Understanding how people function: psychology, sociology, politics, government, history, anthropology, law, economics
5. Identifying and measuring the environment: taxonomy, resource inventory, air-photo interpretation
6. Learning and developing basic life skills: communication, thinking, making decisions, logic, planning, philosophy, ethnics, and others
7. Learning special skills: mathematics, statistics, computer science, resource management, law
8. Learning about the world: Students should recognize that not all learning takes place in the classroom. Exploring different careers, participating in campus and community activities, and independent research all contribute to continuing growth.

For students who wish to specialize further, natural resources offers a variety of options—wildlife science, forest science, aquatic science, and fishery science.

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

**Food Science**

The food science program area is designed to provide students with basic skills and the knowledge necessary to ensure an adequate food supply. Students in this program take a core of fundamental courses and in consultation with faculty advisers select courses suitable for specific career objectives.

The core is designed to meet minimum guidelines of the Institute of Food Technologists, the professional society of United States food scientists. The student thus has an opportunity to become well prepared for a career in food science. 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, and it can be useful in others as well. Opportunities for graduate study exist at a number of universities, including Cornell.

The program is offered by the Department of Food Science, housed in Stocking Hall. A full-scale dairy plant, cafeteria, and extensive laboratory facilities are available for training, research, and employment.

During the first two years, students take courses in biology, chemistry, physics, microbiology, and introductory food science, as well as make progress in meeting general college requirements. 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.

Students are required to take Introductory Food Science, Introductory Nutrition, Food Analysis, Nutritional Aspects of Food Processing, Food Engineering, Sanitation and Public Health, Food Processing I and II, Food Chemistry, Sensory and Objective Evaluations of Foods, Food Microbiology, food chemistry laboratories, and introductory statistics.

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.

## Plant Science

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

Study in the plant sciences is offered jointly by the Department of Agronomy, in Emerson Hall, and the departments of Floriculture and Ornamental Horticulture, Plant Breeding, Plant Pathology, Pomology, and Vegetable Crops, all located in the Plant Science Building.

## Agronomy

**Crop science.** Courses required for all students specializing in crops include general biology, botany, plant physiology, general chemistry, mathematics, crops, and soils. Students who anticipate a career in agricultural production or service after completion of the B.S. degree should take additional courses in crops, soils, crop physiology, economics, communications, plant pathology, entomology, nutrition, genetics, microbiology, and climatology. Students planning graduate or professional study beyond the bachelor's degree should take advanced work in biochemistry; botany; qualitative, quantitative, and organic chemistry; calculus; physics; and statistics.

## Botany

See the botany concentration of the Division of Biological Sciences, p. 222.

## Floriculture and Ornamental Horticulture

The field of 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 education.

To obtain the Bachelor of Science degree with specialization in floriculture and/or landscape horticulture, a student must complete the core curriculum consisting of the following courses:

Flor 100, Introduction to Floriculture and Ornamental Horticulture  
Flor 213, Woody Plant Materials  
Flor 312, Garden and Interior Plants II  
Flor 401, Principles of Plant Propagation  
Bio S 241, Plant Biology (Introductory Botany)  
Bio S 242, Plant Physiology (lecture)  
Bio S 244, Plant Physiology (laboratory)  
Agron 200, Nature and Properties of Soils  
Entom 241, Applied Entomology, or Entom 212, Insect Biology  
PI 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 their adviser, transfer students 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 220, LA 224, LA 340, and LA 311. Freehand drawing courses may not be applied to this requirement.

Students are also asked to select an area of emphasis in either floriculture or landscape horticulture by the beginning of their junior year. Specialization in floriculture prepares a student for a career in greenhouse florist-crop production management and wholesale and retail florist marketing, whereas specialization in landscape horticulture trains one 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 all of these areas. Similarly, programs in horticultural business management, research, teaching, extension education, and communications may be arranged across the two specialization areas. Students wishing to prepare for graduate study in horticulture 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.

The department offers each student, working with his or her faculty adviser, an opportunity to tailor a program to achieve individual educational objectives in floriculture and landscape horticulture. Students are also encouraged to take courses in these areas: agricultural economics and business management, agricultural engineering, agronomy (soils), computer science, ecology, entomology, plant pathology, plant physiology, oral and written expression, and plant taxonomy. Use of electives to pursue study in the humanities and in other areas of special interest to the student is encouraged and provides opportunities for broadening and enriching learning experiences. Numerous opportunities to become familiar with the horticultural industries and professions are provided through field trips, guest lecturers, and optional special topic and work experience programs.

Incoming freshmen are advised during their first year by the department's faculty freshman adviser and afterwards by a faculty adviser whose expertise is similar to the career interests of the students. A considerable number of the undergraduate students in the department transfer to Cornell after completing two years at another institution. These students are assigned immediately to a faculty adviser according to their career interests.

Questions concerning the undergraduate curriculum, advising, and related matters should be addressed to Dr. Kenneth W. Mudge, Undergraduate Curriculum Coordinator, Department of Floriculture and Ornamental Horticulture, 13 Plant Science Building, Ithaca, New York 14853 (telephone: 607/256-4586).

The department's main office is in 20 Plant Science Building. Other departmental facilities include classrooms and laboratories in the Plant Science Building, greenhouses and laboratories at the Kenneth Post Laboratory, the Test Garden, the Turfgrass Field Research Laboratory, landscape architecture studios in East Roberts Hall, and freehand drawing studios in Mann Library.

While the Landscape Architecture Program is a component of the Department of Floriculture and Ornamental Horticulture, it is described separately on pages 33-34.

## Plant Sciences, General

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 in the service and supply industries, as extension agents, as teachers, and as research technicians.

More than a hundred courses are offered that deal directly with some area of plant science. Other courses relating to plant science are offered in agricultural meteorology, food science, and soil science. In addition, an interest in plant science can be combined with agricultural engineering, conservation, education, extension, marketing, statistics, international agriculture, or some other area of specialization.

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

## Plant Breeding

Plant breeding provides undergraduates with (1) preparation for graduate study leading to advanced degrees in plant breeding and plant genetics; (2) preparation for work in producing and marketing of 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 for students to choose from 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

Plant pathology requires broad training in the physical and biological sciences plus a general background in the area of crop production with emphasis on crop protection. Specific requirements depend upon the career the student is interested in, such as 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 agronomy, entomology, floriculture and ornamental horticulture, pomology, or vegetable crops complete the program.

## Plant Protection

This specialization is offered for students who are interested in pest management for 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, insect pest management, introductory plant pathology, plant disease control, weed science, and pest management for plant protection 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 engineering, agronomy, biochemistry, communication arts, 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, on a farm, at an experiment station, with an agricultural company, or with a regulatory agency is encouraged.

### Pomology

Pomology provides students a choice of two options: pomology or fruit production. While the two programs are quite similar, they are designed to meet the needs and interests of students preparing for two different lines of work. The pomology option is intended to provide students with somewhat more training in basic sciences in preparation for professional service with agencies concerned with fruit production and further study at the graduate level. The fruit production option is intended to meet the needs of students planning to operate or manage fruit farms or to engage in similar work.

<i>Recommended Courses</i>	<i>Fruit Production Option</i>	<i>Pomology Option</i>
Pomology	20 credits	20 credits
Biological sciences	8 credits	14 credits
Entomology	6 credits	3 credits
Plant pathology	4 credits	4 credits
Agricultural economics	11 credits	
Agricultural engineering	5 credits	
Plant breeding	4 credits	4 credits
Chemistry, physics, and mathematics, in addition to distribution requirements		20 credits

### Vegetable Crops

Vegetable crops is one of the most diverse applied and scientific fields in agriculture. In New York more than twenty economically important vegetables are produced and marketed. Vegetable crops have a high value per acre, making it economically feasible to invest relatively large sums in land, equipment, fertilizers, seed, and pesticides. Many vegetables are highly perishable; consequently, considerable expenditure is made for refrigeration and special storage facilities as well as for packaging and handling techniques that have been specifically developed for each particular crop.

The opportunities for trained personnel are numerous in all aspects of vegetable production and the closely related fields of purchasing, processing, merchandising, extension, and banking. Some students may continue their studies in graduate school in preparation for teaching, research, or cooperative extension work in colleges and universities or in private industry. Recently there has been an increased interest in growing vegetables in tropical countries, and international agriculture, with a specialization in vegetable crops, provides excellent training for this vocation.

The different specialties within vegetable crops afford a very flexible curriculum. Courses are chosen by the student in consultation with an adviser and other members of the staff. Students usually take most of the courses offered by the Department of Vegetable Crops and commonly choose other courses from accounting, agricultural geography, and marketing; soils, soil fertility, and regional agriculture; plant biology, physiology, ecology, and anatomy; oral

expression; food sciences; nutritional sciences; plant genetics, statistics, and plant breeding; economic entomology, plant diseases and their control, and weed science. Students supplement their course work with study in areas in which they have particular interest.

## Special Programs and Career Options

Some students are interested in pursuing a broad general education in agriculture and the life sciences. Others are interested in pursuing a specialized interest, while still others are uncertain about their career objectives. Such students, in cooperation with their faculty advisers, plan a general studies sequence suited to their individual interests, abilities, and objectives. Independent study in areas outside of existing program areas must be planned with a faculty adviser. Information on these options is available in the Office of Student Affairs, 17 Roberts Hall.

### Cooperative Extension

Students may prepare for cooperative extension careers in agricultural production, 4-H youth development, community development, and homes and grounds education. With the help of designated advisers, courses selected will meet requirements for (1) preparation in agricultural technology in a department of the college, and (2) preparation in social sciences, communications, and program methodology. A limited number of cooperative extension agent positions are filled from each year's graduating class.

Students desiring to prepare for extension careers in commercial agriculture will complete a two-part requirement.

1. Each student must complete 15 credits or more in oral communication, written communication, psychology, and sociology, with at least one course in each area. Freshman Seminars may not be used to fulfill the written communication requirement. It is strongly suggested that students also complete courses in education, particularly in curriculum development and adult education.
2. Students choose one of the specializations listed below and work with the adviser to schedule their course work. Each student must complete the requirements for a specialization.

<i>Specialization</i>	<i>Adviser</i>
Animal science and dairy production	R. Warner
Farm business management and finance	G. Casler
Field crops and soil science	D. Lathwell
Floriculture and ornamental horticulture	G. Good
Pomology	G. Oberly
Vegetable crops	W. Kelley

Students who want to prepare for careers in 4-H program positions complete part 1 as outlined above and are encouraged to concentrate on one or more areas of agricultural technology but not necessarily at the level required for a specialization. Advisers are assigned as follows:

Plant sciences	E. Schautler
All other areas	G. Broadwell

### General Studies in Agriculture

This specialization allows students to design courses of study suited to their individual interests, abilities, and objectives (1) for general education in agriculture or agricultural science, (2) for temporary classification to help them define vocational interests and goals, or (3) for independent study in a specialized field not encompassed by the existing

program areas. For example, undergraduates in CALS may develop a nutritional sciences concentration through the general studies in agriculture. However, most undergraduates who major in nutrition are admitted through the College of Human Ecology. See page 334.

The general agriculture option includes production as well as technical courses in agriculture. Students, with help from their advisers, will select a range of agricultural electives to provide a broad background of agricultural experience. The minimum course and distribution requirements for general agriculture are those required of all students in the college. Advanced courses in the basic agricultural and life sciences are included. Students should contact the Office of Student Affairs for a list of advisers.

### International Agriculture

International agriculture provides students with an understanding of the special problems of applying basic knowledge to the processes of agricultural modernization 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 socioeconomic 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. The study of a foreign language is required.

In addition to the college distribution requirement of 45 credits, students majoring in international agriculture must take a minimum of 32 credits. A minimum of 5 credits in international agriculture and 8 credits 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. For additional information, students should contact E. B. Oyer (telephone: 256-2283).

### Statistics and Biometry

Statistics is concerned with quantitative aspects of scientific investigation: design, measurement, and summarization, and the making of inferences. 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 business and industry, 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.

Courses specifically required are Computer Science 100 (or Agricultural Engineering 304) and 211; Industrial and Labor Relations 310; Mathematics 191 or 111, 122 or 112 or 192, and 221–222 or 214–215–218; and Statistics and Biometry 200, 408–409, 416–417, 601–602, and 607. Recommended courses include Agricultural Economics 310; Agricultural Engineering 475; Computer Science 104, 107, 108, and 314; Mathematics 421–422 and 472; Operations Research and Industrial Engineering 320–321 or Agricultural Economics 412; Philosophy 231 or Mathematics 381; Statistics and Biometry 605, 606,

and 662; and courses in quantitative methods in various disciplines. Work experience gained through summer employment or undergraduate teaching is highly recommended. Students should contact Professor W. Federer for information (telephone: 256-5488).

### Teacher Preparation

For information about teacher preparation and certification to teach agricultural subjects students should contact professor W. Drake, Department of Education, 204 Stone Hall (telephone: 256-2197).

## Description of Courses

Undergraduate and graduate courses in the college are offered through the seventeen academic departments 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 005 Basic Review Mathematics** Fall or spring. 3 credits (this credit is not counted toward the 120 credits required for the degree). Primarily for entering students.

Fall: M W F 8 (two sections) or 12:20 (two sections). Spring: M W F 12:20 (two sections). H. A. Geiselman and staff.

Exposes students to some of the concepts necessary for success in other mathematics and science courses. Topics include exponents and radicals, conversion of units, algebraic fractions and factoring, solving equations in one or more unknowns, ratio, proportion and variation, percent and mixture problems. Considerable emphasis is placed on the analysis and reasoning involved in the solution of verbal problems requiring the use of mathematics.

**ALS 027 Introduction to Farm Techniques** Fall or spring. No credit. Grade does not appear on transcript. For permission to register, contact the Office of Career Development, 16 Roberts Hall.

Fall: T or W 1:25–4:30. Spring: M T W R or F 1:25–4:30. Classes meet at various college farm facilities. W. F. Miller.

Provides supervised instruction in the basic manual skills of farming, including milking by hand and machine, handling livestock, and operating tractors and field equipment. General orientation to the practices and procedures of day-to-day farm operation.

**ALS 100 American Indian Studies: An Introduction** Fall. 3 credits.

Lec, T R 10:10–11:25; disc to be arranged. R. Fougner.

This course provides a foundation for the study of the American Indian. Emphasis will be placed on the social, cultural, historical, educational, and human development of the American Indian. Guest lecturers from Cornell staff and the Indian community will serve to broaden the scope of the course.

**ALS 115 Introductory College Mathematics** Fall or spring. 4 credits.

M W F 8, 9:05 (two sections), or 12:20 (two sections); lab, T 11:15 or 12:20, or R 11:15 or 12:20. Evening exams. H. A. Geiselman, S. C. Piliero.

Designed to give students with sound high school mathematics backgrounds a unified treatment of the basic concepts of college algebra, analytic geometry, and the elements of calculus. Considerable emphasis is placed on the concept of function, graphing, problem solving, and methods of proof. The Cornell University Computing Language (PL/C) is taught and used to strengthen and integrate the mathematical topics covered.

**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.

D. Schwartz and 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 401–402 American and World Community (also Government 401–402)** 401, fall; 402, spring. 3 credits each term.

M W 7:30 p.m. N. E. Awa, R. A. Baer, H. Feidman, J. C. Mbata, R. J. McNeil, and others.

The theme of world community is examined in terms of the directions that the concept suggests, with special reference to the role of the United States in translating the concept to reality. The course seeks to examine the American experience against the background of world community from the points of view of the humanities, the social sciences, the natural sciences, and religious studies.

**ALS 469 Agriculture, Society, and the Environment (also Biological Sciences 469)** Spring. 3 credits.

Lecs, T R 12:20; disc W evenings and by arrangement. D. Pimentel and others.

This course, designed and conducted by Cornell students and staff, is aimed at interrelating the many facets of agriculture. The course stresses the importance of a holistic approach to agriculture by offering perspectives on many factors related to food production: soil fertility, plant breeding, pest control, ecosystems, world food problems, livestock production, energy, economics, social and political concerns, labor problems, and land and water management. This approach is used to develop the basic framework on which future options and strategies for food production in the United States and the world are examined and evaluated.

**ALS 661 Environmental Biology (also Biological Sciences 661)** Fall or spring. 1–3 credits

Prerequisite: permission of instructor.

Hours to be arranged. D. Pimentel.

Focuses on complex energy-environmental problems, using a multidisciplinary approach. Task forces of nine students, each group representing several disciplines, investigate significant energy-environmental problems. Each task force spends two semesters preparing a report for publication, modeled after National Academy of Sciences reports.

**ALS 710 Nurturing Scientific Creativity** Fall or spring. 1 credit. Prerequisite: permission of instructor. S-U grades only.

Hours to be arranged. N. L. VanDemark.

A philosophical approach to issues relating to creative thinking and problem solving, with special

emphasis on the human elements in scientist development, grantsmanship, project development, and research endeavors. Attention will be given to dealing with perceptual, emotional, cultural, and environmental blocks as well as educational, institutional, and governmental deterrents.

## Agricultural Economics

O. D. Forker, chairman; D. J. Allee, B. L. Anderson, R. D. Aplin, R. Barker, S. L. Barraclough, N. L. Bills, D. Blandford, R. N. Boisvert, R. Boynton, J. Brake, A. Buckwell, J. B. Bugliari, D. L. Call, G. L. Casler, L. D. Chapman, G. J. Conneman, J. Conrad, L. M. Day, D. K. Freebairn, G. A. German, D. C. Goodrich, Jr., D. A. Grossman, L. L. Hall, R. B. How, R. J. Kalter, W. A. Knoblauch, E. L. LaDue, W. F. Lazarus, D. Lee, W. H. Lesser, E. McLaughlin, J. F. Metz, Jr., R. A. Milligan, T. D. Mount, A. M. Novakovic, T. T. Poleman, C. Ranney, K. L. Robinson, D. G. Sisler, R. S. Smith, B. F. Stanton, L. Tauer, E. Thorbecke, W. G. Tomek, G. B. White

**150 Economics of Agricultural Geography** Fall 3 credits.

Lecs, M W F 11:15 or 12:20. Prelims, T 7:30 p.m., Sept. 27, and R 7:30 p.m., Nov. 3. D. G. 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.

**220 Introduction to Business Management** Fall 3 credits.

Lec, M W F 10:10; disc, M 12:20–2:15, 2:30–4:25, or 7:30–9:25 p.m.; T 8–9:55, 10:10–12:05, 12:20–2:15, 1–2:55, or 2:30–4:25; W 8–9:55, 10:10–12:05, 12:20–2:15, or 2:30–4:25. In weeks when discs are held, there will be no W lecture. Discs are held instead of a lecture in all but four weeks of the term. 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 social, legal, and economic environments; forms of business ownership; financial statements; cost behavior; and a few key concepts and tools in financial management

**221 Accounting** Spring. 3 credits. Not open to freshmen.

Lecs, M F 10:10; lab, T W or R 8–9:55, 10:10–12:05, 12:20–2:15, or 2:30–4:25. Two evening prelims. J. Sweeney.

A comprehensive introduction to financial accounting concepts and techniques, intended to provide a basic understanding of the accounting cycle and the elements of financial statement analysis and interpretation. Concepts rather than procedures are emphasized.

**240 Marketing** Spring. 3 credits.

Lecs, M W F 11:15; lab, M 2:30–4:25, T 12:20–2:15 or 2:30–4:25, W 2:30–4:25, R 12:20–2:15 or 2:30–4:25, or F 10:10–12:05. In weeks labs are held, there will be no F lecture. D. C. Goodrich.

An introductory study of the food marketing system and the society it serves, including the goals and practices of farmers and marketers (in such areas as buying and selling, grading, transporting, packaging, and advertising), price-making institutions (such as commodity futures markets), the behavior and purchasing practices of consumers, and the interrelationships among these groups.

**250 Introduction to Energy Resources** Spring 3 credits.

Lecs, M W F 11:15. D. Chapman.

An introduction to the concepts of efficiency, competitive equilibrium, and social cost. The course focuses on basic energy resources, examining production costs and demand for petroleum, natural gas, electricity, nuclear power, and solar energy. The ownership and regulatory structure of each energy industry is discussed, as well as selected policy issues such as price control, taxation, public ownership, conservation, and renewable resource use.

**302 Farm Business Management** Spring

4 credits. Not open to freshmen. This course is a prerequisite for Agricultural Economics 402.

Lecs, M W F 10:10; lab, T W or R 1:25–4:25. On days farms are visited, the lab period is 1:25–5:30. R. A. Milligan.

An intensive study of problems associated with planning, organizing, operating, and managing a farm business, with emphasis on the tools of managerial analysis and decision making. Topics include management information systems, business analysis, and budgeting, and acquisition, organization, and management of capital, labor, land, and machinery.

**310 Introductory Statistics** Fall. 3 credits.

Prerequisite: ALS 115 or equivalent level of algebra.

Lecs, M W F 12:20; lab, M 2:30 or 3:35, T 2:30 or 3:35, or W 2:30 or 3:35. Evening exams. A. Buckwell.

An introduction to statistical methods. Topics to be covered include the descriptive analysis of data, probability concepts and distributions, estimation and hypothesis testing, regression, correlation and time series analysis, and selected nonparametric methods. Applications from business, economics, and the biological sciences are used to illustrate the methods covered in the course.

**320 Business Law** Fall. 3 credits. Limited to upperclass students.

Lecs, M W F 9:05. One evening prelim.

J. B. Bugliari, D. A. Grossman.

Consideration is given chiefly to legal problems of particular interest to persons who expect to engage in business. Emphasis is on personal property, contracts, agency, real property, and partnerships and corporations.

**321 Business Law** Fall. 4 credits. Limited to upperclass students. Prerequisite: permission of instructor.

Lecs, M W F 9:05; disc, M 4; one evening prelim.

J. B. Bugliari, D. A. Grossman.

The lecture portion is the same as Agricultural Economics 320. Discussions deal with practical applications of the legal principles covered in that course and attempt also to give some deeper insight into the roles and functions of the lawyer and the judiciary in our society.

**322 Taxation in Business and Personal Decision Making** Spring. 3 credits. Recommended: background in accounting and business law.

Lecs, M W 2:30–4. J. B. Bugliari, D. A. Grossman. The impact of taxation, both state and federal, on business and personal decision making. After a brief discussion of tax policy and state and local taxes, an in-depth examination is conducted of federal income and estate and gift taxes affecting individuals and business entities. Both tax management and tax reporting are stressed.

**323 Managerial Accounting and Economics** Fall. 3 credits. Prerequisites: Agricultural Economics 221 and Economics 102 or equivalents.

Lecs, M W 1:25; disc, R 10:10–12:05, 12:20–2:15, or 2:30–4:25, or F 10:10–12:05, 12:20–2:15, or 1:25–3:20. Two evening prelims. J. Sweeney.

An introduction to cost accounting that emphasizes the application of accounting and economic

concepts to managerial control and decision making. Major topics include basic costing, standard costing, cost behavior, cost allocation, pricing, budgeting, inventory control, transfer pricing, measuring divisional performance, and accounting for inflation.

**324 Financial Management** Spring. 3 credits.

Prerequisites: Agricultural Economics 220 or equivalent. Recommended: Agricultural Economics 221 and 310 or equivalents.

Lecs, M W F 9:05; disc, W 2:30–4:25, R 8–9:55 or 12:20–2:15, or 2:30–4:25, or F 9:05–11 or 12:20–2:15. In weeks when discs are held, there will be no F lecture. Discs are held instead of lecture in all but two weeks of the term. Two 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 those investments, and how to generate the 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.

**332 Economics of the Public Sector** Fall.

3 credits. Prerequisite: Economics 102 or equivalent.

Lecs, M W F 11:15; disc to be arranged.

C. Ranney.

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.

**342 Marketing Management** Fall. 3 credits.

Prerequisites: Agricultural Economics 240 and Economics 101–102.

Lecs, M W F 10:10; disc, R 12:20–2:15 or 2:30–4:25, F 8–9:55, 10:10–12:05, or 12:20–2:15. In weeks discs are held, there is no F lecture. D. C. Goodrich.

Deals with principles and practices in the firm's management of the marketing function. Emphasizes the revenue aspects of marketing by considering sales forecasting and strategies in product and brand selection, pricing, packaging, promotion, and channel selection. Identification and generation of economic data necessary for marketing decisions are considered.

**346 Dairy Marketing** Spring. 2 credits. Limited to juniors and seniors. Prerequisite: Economics 101.

Lecs, T R 8–9:55 (first 9 weeks). A. Novakovic.

A review of the structural characteristics of the dairy industry and an analysis of policy issues, pricing systems, and government programs, including marketing orders, price supports, and import policies.

**347 Marketing Horticultural Products** Fall.

3 credits. Prerequisite: Agricultural Economics 240 or equivalent.

T R 8:30–9:55. All-day field trip the last S in September. R. B. How.

A study of markets, marketing channels, and marketing services for fruits, vegetables, and floricultural commodities. An evaluation of marketing alternatives facing growers, shippers, wholesalers, and retailers of horticultural products. The role of public agencies in market information and regulation. The potential for group action to improve marketing operations.

**350 Resource Economics** Fall. 3 credits.

Prerequisite: Natural Resources 201 and introductory economics, or permission of instructor.

Lecs, T R 10:10; disc, M or T 1:25–3:20. Several field trips to be arranged. D. J. Allee.

The application of economic and political science concepts to the use of natural resources, with varying attention to water, land, forests, and fisheries.

Considers regional growth, the impact of urban growth, and public decision making in the resources and environmental management area.

**351 Farm and Food Policies** Fall. 3 credits. S-U grades optional.

Lecs, T R 9:05; disc, R 11:15 or 1:25, or F 10:10. K. L. Robinson.

The course deals broadly with farm and food policies, including price support and storage or reserve policies, agricultural protection, soil conservation programs, the structure of agriculture, and domestic food subsidy programs.

**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. A maximum of 6 credits may be earned in the honors program.**402 Advanced Farm Business Management**

Spring. 3 credits. Prerequisite: Agricultural Economics 302 or equivalent.

Lecs, M W 9:05; disc, W or R 1:25–3:20.

G. L. Casler.

Emphasis is on evaluating the profitability of alternative investments and enterprises. Principal topics include the effects of income taxes on investment decisions, capital investment analysis, linear programming, and financial risk and uncertainty. Experience in computer applications to farm business management is provided.

**405 Farm Finance** Fall. 3 credits. Prerequisite: Agricultural Economics 302.

Lecs, T R 11:15; disc, W 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, leasing, and the forms of business organization.

**406 Farm and Rural Real Estate Appraisal**

Spring. 4 credits. Limited to 45 students.

Prerequisites: Agricultural Economics 302 or equivalent and permission of instructor.

Lecs, T R 10:10; lab, R 1:25–4:25. On days farms are visited the laboratory period is 1:25–5:30. One all-day trip. Staff.

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.

**407 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.

**408 Seminar in Farm Business Decision Making**

Fall. 1 credit. (1 week in intersession) Prerequisite: Agricultural Economics 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.

**409 Farm Management Workshop** Fall. 1 credit. Limited to seniors and graduate students.

T 12:20–2. B. F. Stanton and staff.

Presentation and interpretation of research in farm management and production economics. Each participant conducts a seminar and prepares a publishable evaluation of research results directed toward farmers and extension and business leaders.

**410 Seminar in Farm Business Organization and Estate Planning** Fall (first meeting, last Monday in September). 1 credit. Prerequisite: Agricultural Economics 302 and 405.

M 1:25–3:20. R. S. Smith.

Designed for seniors who plan to return to the home farm or to take positions working with commercial farmers in a finance or management capacity. Topics include choice of a business structure for family farm; organizing and operating a family partnership; initiating and managing a commercial farm corporation; financing, tax, and legal problems in starting, operating, and terminating a two-generation family business; estate-planning problems of farm-owning families. Class presentations are informal. Students solve case problems and prepare papers on their home farm or an assigned problem.

**412 Introduction to Linear Programming** Spring. 3 credits. Primarily for juniors, seniors, and M.S. degree candidates. Prerequisite: Agricultural Economics 310 or equivalent.

Lecs, M W 10:10; lab, W 1:25–3:20 or 3:35–5:20. B. F. Stanton.

An introduction to the concepts and computational procedures of linear programming. Emphasis on interpretation of results, model building, and data requirements for estimation using standard computer programs. Topics include sensitivity analysis, parametric programming, the transportation problem, scheduling, and distribution. Primary applications are made to agriculture and business.

**415 Agricultural Prices** Spring. 3 credits.

Prerequisite: An introductory course in economics, such as Economics 101–102. S-U grades optional.

M W F 11:15. K. L. Robinson.

An analysis of supply and demand characteristics of farm commodities, institutional aspects of pricing farm and food products, temporal and spatial price relationships, price forecasting, and the economic consequences of pricing decisions.

**416 Price Analysis** Spring. 2 credits.

Prerequisites: Agricultural Economics 310 or equivalent and coregistration in Agricultural Economics 415.

Lec, M W 12:20. W. G. Tomek.

The course introduces students to procedures used in empirical studies of demand, supply, and price behavior for agricultural products. Multiple regression techniques are emphasized. Each student is required to specify, fit, and report on an empirical model.

**420 Advanced Business Law** Spring. 3 credits.

Limited to upperclass students.

Lecs, T R 8:30–9:55. One evening prelim.

J. B. Bugliari.

Designed to provide a fairly detailed and comprehensive legal background. Selected areas covered in Agricultural Economics 320 are further developed, and particular consideration is given to the law pertaining to bailments, sales, secured transactions, bankruptcy, and negotiable instruments.

**421 Advanced Business Law** Spring. 4 credits.

Limited to upperclass students. Prerequisite: permission of instructor.

Lecs, T R 8:30–9:55; disc, T 4. One evening prelim. J. B. Bugliari.

Lectures cover the same material as Agricultural Economics 420. The discussions cover aspects of estate planning: estate planning techniques, the law and use of trusts, the law of wills, and federal and New York State estate and gift taxes and probate procedures.

**422 Estate Planning** Spring. 1 credit. Limited to upperclass students. S-U grades only. Cannot be taken by students who are enrolled in or who have taken Agricultural Economics 421.

Lec, T 4. J. B. Bugliari.

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.

**424 Business Policy** Spring. 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 execution from the standpoint of the general manager of an organization, focusing on decision making at the top management level. The course is built around a series of cases. Emphasizes improving oral and written communication skills.

**425 Personal Financial Management** Spring. 2 credits. Limited to juniors and seniors.

Lec, M 12:20–2:15; disc to be arranged. Second hour of lec is omitted in weeks discussions are held. D. A. Grossman.

Managing personal income to maximize financial goals and objectives. Topics include financial institutions, investment alternatives, insurance, retail credit, housing, income taxation, and estate planning. Discussions are devoted to problems and case studies in financial planning for students and young families.

**426 Management of Cooperative Action** Fall.

3 credits. Recommended: Agricultural Economics 220 or equivalent.

Lecs, M W F 11:15. Evening prelim. B. L. Anderson. Investigates the unique aspects of cooperative business organizations. Topics are approached from the point of view of management, the board of directors and members, and include cooperative principles, management decision making, legislation, financing, taxation, and marketing problems cooperatives attempt to handle. Primary focus is on operating cooperatives in agriculture, but an examination of informal group action, bargaining cooperatives, marketing orders, and marketing boards is also included.

**430 Agricultural Trade Policy** Fall. 3 credits.

Primarily for seniors and M.S. degree candidates.

Prerequisites: Agricultural Economics 351 and either Agricultural Economics 352 or Economics 311.

Lecs, T R 11:15; lec or disc, M or W 3:35. Evening prelim. A. Buckwell.

An examination of the rationale and method of commodity trade policy. The course analyzes problems and issues in both developed and less-developed countries and deals with the major questions associated with the organization of international commodity markets.

**443 Food Industry Management** Spring. 4 credits.

Limited to juniors and seniors.

Lecs, T R 9:05–10:35; sec, R 2–3:30.

G. A. German.

A case-study approach is used to examine the application of management principles and concepts to operating problems of food retailers and wholesalers. Areas included are site selection, buying, merchandising, personnel administration, private-label products, and financing expansion programs. Leading food industry specialists frequently join the Thursday session.

**448 Food Merchandising** Fall. 3 credits. Limited to juniors and seniors. Prerequisite: Agricultural Economics 240.

Lecs, T R 10:10; sec, T 1:25 or 2:30, or R 1:25 or 2:30. 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.

**449 Field Study of Marketing Institutions** Fall. 2 credits. Prerequisites: Agricultural Economics 342, previous enrollment or concurrent registration or permission of instructor. Field trips will cost approximately \$185.

W 2:30–4. Two 1-day field trips to the upstate area and a 3-day trip to the New York City area during intersession just prior to registration (Jan. 15–18, 1984). Grades are not registered until February.

B. L. Anderson, E. W. McLaughlin.

The course gives students firsthand exposure to examples of marketing institutions and marketing management through field trips, guest lectures, case studies, and class discussions. Emphasis is on the applied aspects of marketing, marketing functions, and marketing strategies.

**450 Evaluating Resource Investment and Environmental Quality** Spring. 3 or 4 credits.

Primarily for juniors and seniors. Prerequisite: an introductory course in economics, a 300-level agricultural economics course, or permission of instructor.

T R 10:10–11:30; disc to be arranged. D. J. Allee.

Means of reaching decisions on environmental questions. Concepts of social value and cost-benefit analysis, determination of degrees of importance of environmental problems, environmental impact statements, definitions of environmental quality, and questions of political economy.

**452 Land and Mineral Economics** Spring.

3 credits. Prerequisite: Economics 311.

Lec, T 2:30–3:20; sec, R 2:30–4:25. R. J. Kalter.

The application of economic concepts to the analysis of private and public sector resource management/use issues. Land and mineral markets, the role of land in production, mineral valuation, taxation, financing and credit, legal and institutional factors, use planning and restrictions, and public land management will be stressed.

**464 Economics of Agricultural Development**

Spring. 4 credits. Prerequisites: Agricultural Economics 150, Economics 101–102, or permission of instructor.

T R 9:05 and T or W 1:25. D. K. Freebairn.

An examination of the processes of agricultural development in Third World nations and their interactions with United States policy. Agricultural and rural development policy, the interdependence of agriculture with other sectors, alternative forms of agricultural organization, and policies tending to alleviate highly concentrated income distributions are all emphasized.

**499 Undergraduate Research** Fall or spring

1–4 credits. Limited to seniors 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; this permission must be attached to course enrollment material. S-U grades optional.

Permits outstanding undergraduates to carry out independent study of suitable problems under appropriate supervision.

**[605 Agricultural Finance and Capital Management]**

Fall. 3 credits. Prerequisites: Agricultural Economics 402, 405, or equivalent. Offered alternate years. Not offered 1983–84.

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, investment-replacement models, and selected topics on financing agriculture in developing countries.]

**608 Production Economics** Fall. 3 credits.

Prerequisite: Economics 311 or equivalent.

Recommended: Mathematics 108 or 111 or equivalent.

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.

**640 Analysis of Agricultural Markets** Fall, weeks 1–7. 2 credits. Prerequisites: Agricultural Economics 415 and 416 or equivalents.

Lecs, T R 12:20–2:15. L. L. Hall.

This course provides an introduction to agricultural market analysis. Topics include distinguishing characteristics of agricultural markets, equity and efficiency concepts for evaluating market performance, and discussion of the structure of food demand, pricing, and distribution in United States and foreign markets. Presentations and discussions will focus on applications to current problems and issues.

**641 Time in Agricultural Markets** Fall, weeks 8–14. 2 credits. Prerequisites: Agricultural Economics 415 and 416 or equivalents.

Recommended: Agricultural Economics 640.

Lecs, T R 12:20–2:15. W. G. Tomek.

Topics include the economic functions of markets for forward contracts, price behavior and relationships on cash and futures markets, hedging and speculation, and measuring performance. Research results are used to elucidate principles underlying hedging and public policy decisions, but this is not a course on managing positions in futures.

**643 Export Marketing** Fall. 3 credits. Prerequisite: permission of instructor. Estimated cost of field trip, \$100.

Lec, R 2:30–4:45. Overnight field trip to New York City required. W. Lesser.

The history and development of commercial United States exports of agricultural commodities and the mechanics and procedures of exporting. Alternatives in sales contracts, shipping, insurance, financing, business structure, researching markets, and promotion. Trading experiences of specific commodity specialists.

**650 Economic Analysis of Public Policy** Spring. 4 credits. Primarily for graduate students but open to seniors.

T R 9:05–11. R. J. Kalter.

The application of economic theory and analysis to governmental decision making, budgeting, and expenditure processes, with emphasis on the welfare criteria of economic efficiency and income distribution. Techniques of benefit-cost, equity, and environmental analysis will be stressed. Discount rates, benefit estimation, externalities, multipliers, uncertainty, and social welfare functions will be covered.

**651 Economics of Resource Use** Fall. 4 credits.

Lec-sem, F 1:30–4:30. D. Chapman, J. Conrad, T. Mount.

An introduction to recent literature in theory and applied analysis. Dynamic optimization and resource use, externality theory and its application to environmental economics, pricing and taxation. Resource use, income, employment, and other topics as selected by class and instructors.

**652 Special Problems in Land Economics** Fall or spring. 1 or more credits. Limited to graduate students.

Prerequisite: permission of instructor.

Hours to be arranged. D. J. Allee, R. J. Kalter. Special work on any subject in the field of land economics.

**660 Food, Population, and Employment** Fall.

5 credits. Enrollment limited to 15 to ensure that students have an opportunity to work individually with instructor.

M W 2:30–4 and an individual weekly meeting with the instructor. T. T. Poleman.

Examines the links between employment, food, and population growth in less-developed countries. Food economics and the world food situation are treated as cornerstones and examined in historical perspective. Requires a major term paper.

**661 Food, Population, and Employment II**

Spring. 1–3 credits. Prerequisite: permission of instructor.

Individual weekly meeting with the instructor.

T. T. Poleman.

Individual, guided research for students who want to carry on with projects initiated in Agricultural Economics 660 or to undertake new ones.

**[663 Macroeconomic Issues in Agricultural Development]**

Fall. 3 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1983–84.

Lec to be arranged. E. Thorbecke.

Issues such as role of agriculture in economic development, household farm as producing and consuming unit, operation of product and factor markets in agricultural and rural areas, structural transformation of agriculture in the process of economic development, theories of agricultural development, agricultural and rural development strategies and models. The approach followed is theoretical, quantitative, and empirical.]

**664 Microeconomic Issues in Agricultural Development**

Spring. 3 credits. Prerequisite: Agricultural Economics 608, Economics 311, or permission of instructor.

T R 11:15–12:30. R. Barker.

Issues such as production efficiency, induced technological change, allocation of research resources, and the distribution of benefits from new technology are discussed. The theoretical argument is related to applied research problems.

**665 Seminar on Latin American Agricultural Policy**

Fall. 3 credits. Prerequisite: Agricultural Economics 464 or work in Latin American economic and social development.

T 2:30–4:25. D. K. Freebairn.

An examination of policies for the development of the agricultural sector in Latin America, including an identification of policy objectives and a review of the instruments of public-policy implementation. Particular attention is paid to the interactions of agrarian structure, agricultural productivity, and rural welfare.

**666 Seminar in Agricultural Development**

Fall or spring. 1–3 credits. The seminar is normally taught when a visiting professor is available who has had recent direct experience in low-income countries.

Hours to be arranged.

An analysis of current problems for the development of the agricultural sector of low-income countries, with emphasis on the implications of such problems to the definition of research.

**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.

**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.

**708 Advanced Production Economics**

Fall. 3 credits. Prerequisites: Agricultural Economics 608, 710, or equivalents. Offered alternate years.

Hours to be arranged. R. N. Boisvert.

Theoretical and mathematical developments in production economics, with emphasis on estimating microproduction and macroproduction relationships, scale economies, technical change, factor substitution, and recently developed functional forms. Discussions of several other selected topics such as risk, supply response, and household production functions change from year to year based on student interest.

**710 Econometrics I**

Spring. 4 credits. Not open to undergraduates. Prerequisites: Statistics 416 and 601 or equivalent.

Lecs, T R 2:30–4:25. W. G. Tomek.

This course covers basic topics in econometrics at an intermediate level, reviewing the least squares estimator, continuing with topics such as specification error and autocorrelated residuals, and concluding with simultaneous equations estimators. The content is designed for Ph.D. students who will be doing empirical research as applied economists.

**711 Econometrics II**

Fall. 4 credits. Prerequisite: Agricultural Economics 710 or equivalent. Statistics 417 recommended.

Lecs, T R 10:10–12:05. T. D. Mount.

Coverage beyond that of Agricultural Economics 710 of generalized least squares, testing linear hypotheses, the effects of specification errors, and regression diagnostics. Applications include seemingly unrelated regressions, estimation with pooled data, models with stochastic coefficients, models with limited dependent variables, and distributed lag models.

**712 Quantitative Methods I**

Fall. 4 credits.

Prerequisite: Statistics 416 or equivalent.

Recommended: statistics 417.

Lecs, M W F 11:15. 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 are treated in detail. Applications are made to agricultural, resource, and regional economic problems.

**713 Quantitative Methods II**

Spring. 4 credits.

Prerequisite: Agricultural Economics 712 or Economics 517 or permission of instructor.

Lecs, M W F 9:05–9:55; disc, F 12:20–2:15.

J. M. Conrad, R. A. Milligan.

A study of quantitative techniques used to solve dynamic problems. The first half of the course is concerned with dynamic optimization; the second, with simulation.

**717 Research Methods in Agricultural Economics**

Spring. 2 credits. Limited to graduate students.

M 1:25–3:20. B. F. Stanton, D. G. Sisler.

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.

**[730 Seminar on Agricultural Trade Policy]**

Spring. 3 credits. Limited to graduate students.

Prerequisites: Agricultural Economics 430 and basic familiarity with quantitative methods. Offered alternate years. Not offered 1983–84.

F 1:25–4. D. Blandford, D. G. Sisler.

A discussion of selected topics in agricultural trade policy, such as export promotion versus import substitution in developing countries, and the role of international commodity agreements. The preparation of a term paper is an important part of the course.]

**740 Agricultural Markets and Public Policy** Spring, weeks 1–7. 2 credits. Limited to graduate students. Prerequisite: familiarity with multiple regression techniques on the level of Statistics and Biometry 601. Recommended: Agricultural Economics 640.

T R 12:20–2:15. W. H. Lesser.

Develops the concepts and methodology for analyzing and analyzing the effects of public-policy directives on the improvement of performance in the United States food marketing system. Topics include a survey of industrial organization principles, antitrust and other legal controls, coordination systems in agriculture, and cooperative theory and performance. An application of these techniques to analyzing marketing problems in developing economies is also presented.

**741 Seminar on Methods of Trade and Commodity Policy Analysis** Spring, weeks 8–14. 2 credits. Limited to graduate students. Prerequisites: basic training in quantitative methods (Agricultural Economics 710 and 712 or equivalent) and permission of instructor. Recommended: Agricultural Economics 640.

F 1:25–4. D. Blandford.

A discussion of the structure, use, and usefulness of alternative quantitative methods of commodity policy analysis. Preparing a term paper is an important part of the course.

**750 Economics of Renewable Resources** Spring. 4 credits. Prerequisites: Economics 509 and Economics 518, or Agricultural Economics 713.

T R 2:30–4:25. J. M. Conrad.

This course focuses on recent developments in mathematical bioeconomics as they relate to the management of renewable resources. The theory and methods of dynamic optimization are briefly reviewed. Theory and applied studies in fishery, forestry, and water resource economics are examined along with the role and effectiveness of alternative public policies.

**751 Seminar on Agricultural Policy** Spring. 2 credits. Limited to graduate students. Offered alternate years.

W 1:25–3:20. K. L. Robinson.

A review of the professional literature relating to agricultural policy issues and techniques appropriate to the analysis of such issues.

**754 Sociotechnical Aspects of Irrigation (also Rural Sociology 754 and Agricultural Engineering 754)** Spring. 3 credits.

Hours to be arranged. R. Barker, M. L. Barnett, E. W. Coward, Jr., G. Levine.

Examines irrigated agriculture and its relation to agricultural development. Emphasis on social processes within irrigation systems and interactions with the social setting. The seminar provides an opportunity to examine systematically the institutional and organizational policy issues associated with the design and operation of systems of irrigated agriculture.

## Agricultural Engineering

N. R. Scott, chairman; L. D. Albright, J. A. Bartsch, J. K. Campbell, J. R. Cooke, D. S. Durnford, R. B. Furry, K. G. Gebremedhin, R. W. Guest, W. W. Gunkel, D. A. Haith, W. W. Irish, L. H. Irwin, W. J. Jewell, R. K. Koelsch, G. Levine, R. C. Loehr, H. A. Longhouse, D. C. Ludington, T. G. Miller, W. F. Miller, R. E. Muck, R. A. Parsons, R. E. Pitt, G. E. Rehkgugler, J. W. Spencer, T. S. Steenhuis, M. B. Timmons, L. P. Walker, M. F. Walter

**110 Farm Metal Work** Fall or spring. 2 credits. Lec, R 9:05; fall labs, M or T 1:25–4:25; spring labs, M T or R 1:25–4:25. Staff.

M lab, limited to 24 students, includes instruction in the fundamentals of metal lathe work and arc and

oxyacetylene welding. T and R labs, each limited to 20 students, include instruction in sheet metal work, pipe fitting, hot and cold metal work, and arc and acetylene welding.

**132 Farm Carpentry** Fall. 2 credits. Each lab limited to 15 students.

Lec, T 9:05; labs, W or R 1:25–4:25.

H. A. Longhouse.

Instruction in the fundamentals of farm carpentry, including concrete work, and equipment and buildings constructed of wood. Each student is required to plan and construct an approved carpentry project.

**151 Introduction to Agricultural Engineering and Computing** Fall. 2 credits. Prerequisite: one term of calculus or concurrent registration in a calculus course.

Lec, T 1:25; lab, F 1:25–3:20. J. R. Cooke.

An introduction to digital computing using the PL/C language through the use of computing problems in agricultural engineering subjects and related areas such as environmental technology and agriculture.

**152 Computing with Graphics** Spring. 2 credits. Prerequisite: Agricultural Engineering 151.

Lec, T 1:25; lab, F 1:25–3:20. R. B. Furry.

An introduction to digital computing using the FORTRAN language. Applications to engineering graphics.

**153 Engineering Drawing** Fall. 2 credits. Limited to 72 students (36 in each lab).

Lecs, M 9:05; lab, M or T 1:25–4:25.

H. A. Longhouse.

Designed to promote an understanding of the engineer's universal graphic language. The lectures and laboratories develop working knowledge of drawing conventions, drafting techniques, and their application to machine and pictorial drawing problems. Introduction to descriptive geometry and use of interactive computer graphics is included.

**200 Undergraduate Seminar** Spring. 1 credit.

Lec, M 2:30. N. R. Scott.

A forum to discuss the contemporary and future role of agricultural engineering in society. A series of lectures will be given by practicing agricultural engineers, Cornell faculty members, and students. Written critiques are required. Students may take the seminar more than once but are limited to 2 credits maximum.

**201 Introduction to Energy Technology** Spring. 3 credits. Prerequisite: high school or college physics. S-U grades optional.

Lec, M W F 10:10. Evening prelims. L. D. Albright.

Basic concepts of energy and traditional and alternate sources of energy. The energy transfer process is investigated. Topics include heating, cooling, solar radiation, electricity, hydropower, refrigeration, wind power, geothermal energy, biogas production, and energy economics.

**208 Application of Physical Sciences I** Fall.

3 credits. Prerequisite: a term of calculus and high school physics or a year of college physics.

Lec, T R 8:20–9:55; rec, W 8 or 9:05.

D. C. Ludington.

The application of statics, dynamics, mechanics of materials, and fluid mechanics to physical problems in agriculture. Topics include torque, free-body diagrams, friction, energy, stress, bending, shear, fluid flow, and wall pressures. Emphasis is on problem solving.

**209 Application of Physical Sciences II** Spring. 3 credits. Prerequisite: Agricultural Engineering 208.

Lecs, T R 8:20–9:55; rec, W 8 or 9:05.

D. C. Ludington.

A continuation of Agricultural Engineering 208. The laws of thermodynamics and principles of energy transfer, psychrometrics, and electricity are covered. Topics include applications in agriculture of the

various gas and vapor cycles used in engines and refrigeration, heat conduction through multiple layers, convection, thermal radiation, and behavior of air and water vapor mixtures. Solving practical problems is emphasized.

**211 Agricultural Mechanization: An International Perspective** Fall. 2 credits. S-U grades optional.

T R 9:05–9:55. J. K. Campbell.

A study of the tools and machines that are used to mechanize agriculture, with emphasis on developing countries. Topics include animal and mechanical power; tillage, planting, and harvesting tools and machines; and social considerations.

**221 Plane Surveying** Fall or spring. 3 credits. S-U grades optional.

Fall: lab, M 1:25–4:25; lec M 12:20, R 11:15 or lab,

T 1:25–4:25; lec T 12:20, R 11:15. Spring: lab, M

1:25–4:25; lec, M 12:20, R 11:15. T. G. Miller.

Introduction to plane surveying. The use and care of equipment is stressed during field problems related to construction and mapping. Topics include survey specifications, standards of accuracy, business and professional practices.

**250 Engineering Applications in Biological Systems** Spring. 3 credits. Prerequisite:

coregistration in Mathematics 294. Recommended for the sophomore year.

Lec, M W F 12:20. R. E. Pitt.

Case studies of engineering problems in agricultural and biological systems, including animal and crop production, environmental control, energy, and food engineering. Emphasis is on the application of mathematics, physics, the engineering sciences, and biology to energy and mass balances in agricultural systems.

**304 Introduction to Computer Uses in Data Analysis** Spring. 4 credits. Prerequisite: one course

in college mathematics or statistics or permission of instructor. S-U grades optional.

Lecs, T R 11:15; lab, M T W R or F 1:25–2:15.

Prelims: 7:30 p.m. Feb. 23 and April 15. R. B. Furry. An introductory course in computing for those interested in using digital computers to handle data. Topics include description and preparation of data, preparing and processing computer programs, computer attributes and applications, computer library programs, and related computing facilities. No prior knowledge of computers or computer languages is necessary.

**305 Principles of Navigation** Spring. 4 credits.

Lecs, M W F 8; disc, R 8. D. C. Ludington.

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.

**310 Advanced Farm Metal Work** Spring. 1 credit (2-credit option available). Prerequisite: Agricultural Engineering 110 or permission of instructor.

Lab W 1:25–4, (second lab must be arranged for

2-credit option). Staff.

Advanced welding and metal construction project.

**311 Farm Machinery** Fall. 3 credits. Each lab

limited to 16 students. Prerequisite: high school physics or equivalent.

Lec, T R 11:15; rec-lab, M T or W 1:25–4:25.

W. W. Gunkel.

A study of the operating principles, use, selection, and methods of estimating costs of owning and operating farm machines. Lab work includes practice in the calibration of planting, fertilizing, and pesticide application machinery, and study of the functional characteristics of agricultural machines and machine components.

**312 Internal Combustion Engines for Agriculture**

Spring. 3 credits. Each lab limited to 16 students. Students missing the first week of classes without permission of instructor are dropped so others may register. Prerequisite: high school physics or equivalent.

Lec, T R 11:15; lab, M T or W 1:25–4:25.

G. E. Rehkugler.

A study of the principles of operation, adjustment, and maintenance of hydrocarbon-fueled single-cylinder and multicylinder internal combustion engines. Topics include engine cycles, fuels, lubricants, carburetion, fuel injection systems, ignition, charging circuits, valve reconditioning, and engine testing.

**315 Electricity: Its Use and Control**

Spring. 3 credits. Prerequisite: Physics 102 or equivalent.

Lec, T R 10:10; lab, T or R 1:25–4:25.

D. C. Ludington.

The application and control of electricity for power, lighting, and heat are studied. Principles of operation and selection of single-phase equipment for agriculture are emphasized. Conventional and solid state controls are included. Laboratories offer hands-on experience.

**321 Soil and Water Management**

Spring. 2 credits. S-U grades optional.

Lec, M 8; disc-lab, M 1:25–4:25. M. F. Walter.

A study of the technological principles and practices used in soil and water management. Natural processes and engineering practices are discussed in the context of total water-management systems. Engineering aspects of water management, including irrigation, drainage, erosion control, and pollution abatement are examined. Case studies are used to illustrate the impacts of technology on water systems.

**331 Farmstead Production Systems**

Fall. 3 credits. S-U grades optional.

M W F 9:05. K. G. Gebremedhin.

A study of layout, material handling, and environment associated with agricultural production on the farmstead. Planning and design techniques pertaining to biointrinsic and integrated systems are emphasized.

**332 Farm Buildings Design**

Fall. 2 credits. Prerequisite: concurrent or previous registration in Agricultural Engineering 331. Intended for students without backgrounds in statics or properties of structural materials.

Lec, T R 10:10. K. G. Gebremedhin.

Structural design of buildings used for farmstead production systems. Wood is emphasized as a structural material.

**371 Hydrology and Chemical Movement in the Landscape**

Spring. 3 credits. Prerequisites: Agronomy 200 or equivalent or permission of instructor.

Lec, T R 9:05; lab-lec, W 1:25–4:25.

T. S. Steenhuis, R. E. Muck.

The movement of water and chemicals (nutrients, pesticides, heavy metals) through the environment along with their implications with regard to land disposal of wastes and agricultural production is discussed. Emphasizes basic understanding and the probabilistic nature of the processes involved, but some problem solving is done.

**401 Career Development in Agricultural Engineering**

Fall. 1 credit. Limited to seniors. S-U grades only.

Lec, T 12:20. Staff.

A presentation and discussion of the opportunities and qualifications for, and responsibilities of positions of, service in the various fields of agricultural engineering.

**420 Introduction to Marine Pollution and Its Control**

Summer. 2 credits. Prerequisite: Biological Sciences 364 or permission of instructor. A special two-week course offered at Cornell's Shoals Marine

Laboratory. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$590.

Daily lects, 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 waste water; organic carbon determinations; microbial tests for *Salmonella*, *E. coli*, and *Streptococcus*; and practical field projects.

**451 Energy Systems Engineering**

Spring. 3 credits. Prerequisite: Agricultural Engineering 250, Mathematics 294, and thermodynamics.

Lec, M W F 12:20. L. P. Walker.

This course is structured to provide engineering students with an understanding of the physical and biological principles of alternative energy technologies. Our terrestrial energy balance and its impact on energy availability will be discussed. Several technical alternatives for harvesting energy from our environment will be investigated. In addition, some of the logistical and technical problems associated with integrating alternative energy technologies into agricultural and industrial production systems will be explored.

**461 Agricultural Machinery Design**

Fall. 3 credits. Prerequisite: mechanical design or equivalent.

Lec, T R 10:10; lab, R 1:25–4:25. W. W. Gunkel.

The principles of design and development of agricultural machines to meet functional requirements. Emphasis is given to computer-aided analysis and design, stress analysis, selection of construction materials, and testing procedures. Engineering creativity and agricultural machine systems are also stressed.

**462 Agricultural Power**

Spring. 3 credits. Prerequisite: dynamics and thermodynamics or equivalent.

Lec, T R 10:10; lab, R 1:25–4:25. G. E. Rehkugler.

Use of energy in agriculture. Emphasis is given to basic theory and analysis and testing of internal combustion engines and suitable components for use in farm tractors and other power applications. Soil mechanics related to traction and vehicle mobility; economics and human factors in design are considered.

**465 Processing and Handling Systems for Agricultural Materials**

Fall. 3 credits. Prerequisite: Agricultural Engineering 250.

Lec, T R 11:15; lab, W 2–4:25. R. B. Furry.

Drying, fluid-flow measurement, and material handling applications, with an introduction to dimensional analysis and controls for agricultural engineering applications.

**466 Engineering Design and Analysis of Food Processing Equipment**

Spring. 3 credits. Prerequisite: Food Science 302, its equivalent, or concurrent enrollment in an engineering curriculum.

T R 10:10, R 1:25–4:25. R. E. Pitt.

The analysis and design of food-processing equipment from the point of view of selecting and designing equipment appropriate for transporting or modifying a food product.

**471 Soil and Water Engineering**

Fall. 3 credits. Prerequisite: calculus.

Lec, T R 9:05; lab, R 1:30–4:25. D. S. Durnford.

The application of engineering principles to problems of soil and water management. Analysis and design of water-management systems, including hydrology, hydraulic structures, wells, channels, small reservoirs, erosion and sediment control.

**475 Environmental Systems Analysis** Fall. 3 credits. Prerequisite: computer programming and one year of calculus.

M W F 11:15. D. A. Haith.

Introduction to systems analysis and its application to environmental-quality management. Simulation, linear programming, and dynamic programming applied to problems in water and air pollution control, solid waste disposal, agricultural wastes, and so forth.

**481 Agricultural Structures Design**

Spring. 3 credits. Prerequisite: Civil and Environmental Engineering 371.

Lec, T R 11:15; disc-lab, R 2:30–4:40.

K. G. Gebremedhin.

Application of basic structural concepts to design of agricultural structures. Emphasizes wood structures, including design of trusses, rigid frames, prefabricated panels, and columns.

**482 Environmental Control for Animals and Plants**

Spring. 3 credits. Prerequisite: Agricultural Engineering 250 and thermodynamics.

Lec, M F 11:15; lab, M 1:25–4:25. L. D. Albright.

Analysis and design of the thermal environment of animal housing and greenhouses. Heat flow, air flow, psychrometrics, energy balances, thermal modeling, mechanical and natural ventilation, solar energy, and weather phenomena.

**491 Highway Engineering**

Spring. 3 credits. Prerequisites: junior standing in engineering, fluid mechanics and soil mechanics (may be taken concurrently). Offered alternate years.

Lecs, W F 12:20; lab, F 1:25–4:25. L. H. Irwin.

An introduction to engineering design in professional practice, using the design of highways as the subject of study. Students will use current standards and design criteria in five laboratory design projects. Topics of discussion include planning, economic analysis, human factors and public safety, route location and design, traffic engineering, hydrology and drainage design, soil engineering, highway materials, pavement design, and maintenance.

**497 Special Problems in Agricultural Engineering**

Fall or spring. Variable 1–3 credits. S-U option. Normally reserved for seniors in upper two-fifths of their class. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work and assign the grade. Prerequisite: adequate ability and training for the work proposed.

Staff.

Special work in any area of agricultural 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.

**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.

**551–552 Agricultural Engineering Design Project**

Fall and spring. 6 credits. Prerequisite: admission to the M.Eng.(Agr.) degree program or equivalent preparation.

Hours to be arranged. L. D. Albright 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.

**652 Instrumentation**

Spring. 3 credits. Prerequisite: electrical systems or permission of instructor.

Lecs, T R 12:20; lab to be arranged. N. R. Scott.

The application of instrumentation concepts and systems to physical and biological measurements.

Characteristics of instruments, signal conditioning and interfacing, shielding and grounding, transducers, data acquisition systems, microprocessors, microcomputers, and radiotelemetry are considered.

**672 Drainage** Spring. 4 credits. Prerequisite: Agricultural Engineering 471 or permission of instructor. Offered alternate years.

Lecs, M W F 10:10; lab, R 1:25–4:25.

T. S. Steenhuis.

Analysis and design of surface, subsurface, and combined drainage systems, with emphasis on agricultural applications. The elements of surface, channel, and porous media flow are analyzed, as well as entire systems of collectors, storages, pumps, and methods of overflow protection for large areas. Effect of drainage on water quality is reviewed.

**[673 Irrigation Engineering]** Spring. 3 or 4 credits. Prerequisites: Agronomy 200 and Agricultural Engineering 471 or permission of instructor. Offered alternate years. Not offered 1983–84.

Lecs, M W F 10:10; lab, R 1:25–4:25.

T. S. Steenhuis.

Analysis and design of irrigation systems. Soil-plant-water relationships, water quality, water supplies, water delivery systems; and water distribution systems are analyzed.]

**676 Industrial Waste Management (also Civil and Environmental Engineering 655)** Spring. 3 credits. Prerequisites: Civil and Environmental Engineering 351 and 653 or permission of instructor.

3 lec-discs. R. C. Loehr.

An analysis of the treatment and disposal of industrial wastes, primarily wastewaters. Regulatory and legal aspects; pretreatment; treatment and disposal processes for conventional, nonconventional, and toxic pollutants; industrial-waste survey; case studies of specific industries; opportunities for recycle and reuse. Emphasis is on an understanding of the constraints on industrial-waste discharges and the processes and approaches to meet those constraints.

**677 Treatment and Disposal of Agricultural Wastes** Fall. 3 credits. Prerequisite: permission of instructor.

3 lec-discs, hours to be arranged. R. C. Loehr.

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 applied to animal, food production, and food-and-fiber-processing wastes, using actual systems as examples.

**678 Nonpoint Source Models.** Spring. 3 credits. Prerequisites: Computer programming and calculus. Recommended: previous course work in hydrology or soil and water engineering.

Lecs, M W F 9:05. D. A. Haith.

Development and programming of mathematical models on nonpoint (diffuse) source water pollution. Continuous simulation models of catchment water and sediment movement. Functional models of chemicals in runoff and percolation. Soil chemistry simulation models applied to pesticides, nutrients, salinity, and land disposal of wastes.

**679 Use of Land for Waste Treatment and Disposal** Spring. 3 credits. Prerequisite: permission of instructor.

Lecs, T R 3:35–4:50. W. J. Jewell.

Covers the social, legal, and technical factors, the properties of land and crop systems that make land application of wastes a viable alternative, and the use of fundamentals in the development of regulations and the design of full-scale units.

**685 Biological Engineering Analysis** Fall. 4 credits. Prerequisite: Theoretical and Applied Mechanics 310 or permission of instructor.

M W F 12:20. 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.

**[692 Highway Materials and Pavement Design]**

Fall. 4 credits. Limited to engineering seniors and graduate students. Prerequisite: Agricultural Engineering 491 and Civil and Environmental Engineering 341. Offered alternate years. Not offered 1983–84.

Lecs, M W F 12:20; lab, F 1:25–4:25. L. H. Irwin. Application of geotechnical engineering principles to the selection of materials and 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, aggregates, and bituminous mixture design; base courses and soil stabilization methods; seal-coat design; design of flexible and rigid pavements; design for frost conditions; and pavement evaluation using nondestructive test methods.]

**700 General Seminar** Fall. No credit.

M 12:20. N. R. Scott.

Presentation and discussion of research and special developments in agricultural engineering and related fields.

**701 Special Topics in Agricultural 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.

**750 Orientation for Research** Fall. 1 credit.

Limited to newly joining graduate students. S-U grades only.

Lecs, first 5 weeks, M 3:20; remainder to be arranged. Staff.

An introduction to departmental research policy, programs, methodology, resources, and degree candidates' responsibilities and opportunities.

**754 Sociotechnical Aspects of Irrigation (also Rural Sociology 754 and Agricultural Economics 754)** Spring. 3 credits.

Hours to be arranged. R. Barker, M. L. Barnett, E. W. Coward, Jr., G. Levine.

Examines irrigated agriculture and its relation to agricultural development. Emphasis on social processes within irrigation systems and interactions with the social setting. The seminar provides an opportunity to examine systematically the institutional and organizational policy issues associated with the design and operation of systems of irrigated agriculture.

**761 Power and Machinery Seminar** Spring.

1 credit. Limited to graduate students. Prerequisite: permission of instructor. S-U grades only.

Hours to be arranged. W. W. Gunkel.

Study and discussions of research and new developments in agricultural power and machinery.

**771 Soil and Water Engineering Seminar** Fall or spring. 1–3 credits. Prerequisite: graduate status or permission of instructor. S-U grades optional.

Hours to be arranged. Staff.

Study and discussion of research or design procedures related to selected topics in irrigation, drainage, erosion control, hydrology, and water quality.

**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.

**781 Agricultural Structures and Related Topics**

Seminar Spring. 1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only.

Disc to be arranged. L. D. Albright.

Consideration of farmstead production systems, with emphasis on biological, economic, environmental, and structural requirements.

**785 Biological Engineering Seminar** Spring.

1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only.

Disc to be arranged. N. R. Scott, 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.

## Agronomy

R. F. Lucey, chairman; M. Alexander, A. A. App, D. R. Bouldin, R. B. Bryant, B. E. Dethier, W. B. Duke, J. M. Duxbury, G. W. Fick, D. L. Grunes, R. R. Hahn, E. E. Hardy, W. K. Kennedy, W. W. Knapp, J. Kubota, T. A. LaRue, D. J. Lathwell, A. C. Leopold, D. L. Linscott, M. B. McBride, C. G. Manos, R. D. Miller, R. L. Obendorf, G. W. Olson, A. B. Pack, D. A. Paine, J. H. Peverly, W. S. Reid, S. J. Riha, T. W. Scott, R. R. Seane, T. L. Setter, V. A. Snyder, P. L. Steponkus, A. Van Wambeke, R. J. Wagenet, R. M. Welch, M. J. Wright, R. W. Zobel

## Courses by Subject

Crop Science: 311, 312, 314, 315, 317, 608, 610, 611, 612, 613

Meteorology: 131, 133, 334, 335–336–337–338, 441, 442, 447, 450, 452, 454

Soil Science: 260, 360, 361, 362, 366, 368, 371, 372, 373, 471, 473, 474, 476, 480, 482, 486, 608, 663, 666, 667, 669, 670, 771, 774

**131 (101) Basic Principles of Meteorology** Fall. 3 credits. Limited to 140 students.

Lecs, T R 11:15; lab, M T W or R 1:25–4:25.

B. E. Dethier.

A simplified treatment of the structure of the atmosphere: heat balance of the earth; general and secondary circulations; air masses, fronts, and cyclones; hurricanes, thunderstorms, tornadoes, and atmospheric condensation. In the laboratory, emphasis is on techniques of analysis of weather systems.

**133 (103) Basic Principles of Meteorology, Laboratory**

Fall. 1 credit. Prerequisite: an introductory course in meteorology without a lab.

M T W R 1:25–4:25. B. E. Dethier.

Techniques of analysis of weather systems and the application of dynamical and empirical methods of predicting the daily atmospheric circulation.

**260 (200) Nature and Properties of Soils** Fall or spring. 4 credits. Prerequisite: Chemistry 103, 207, or 215. S-U grades optional.

Lecs, M W F 9:05; lab, M T W or R 1:25–4:25. Fall.

D. J. Lathwell; spring, T. W. Scott.

A comprehensive introduction to the field of soil science, with emphasis on scientific principles and their application in solutions of practical soil management problems.

**311 Grain Crops** Fall. 4 credits. Prerequisite: Agronomy 260 or Biological Sciences 241.

Lecs, M W F 10:10; lab, M T or W 1:25–4:25. One or two 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, oil, fiber, and sugar crops are emphasized.

**312 Forage Crops** Spring. 4 credits. Prerequisites: Agronomy 260 or Biological Sciences 241. Recommended: Animal Science 112.

Lecs, M W F 11:15; lab, M T or W 1:24–4:25. One field trip during a lab period (until 5 p.m.) or on a weekend. 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.

**314 Production of Tropical Crops** Spring.

3 credits. Prerequisite: a course in crop production. Lec, M W F 10:10. M. J. Wright.

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.

**315 Weed Science** Fall. 3 credits. Prerequisites: Agronomy 260, and Biological Sciences 103 and 104 or Biological Sciences 241.

Lecs, T R 8; lab, M T or W 2–4:25. W. B. Duke. Principles of weed science are examined. Emphasis is given to (a) weed ecology, (b) chemistry of herbicides in relation to effects on plant growth, and (c) control of weeds in all crops. Laboratory covers weed identification, herbicide selectivity, herbicide injury symptoms, and farm herbicide problem solving.

**317 Seed Science and Technology** Fall. 3 credits. Prerequisite: Biological Sciences 241 or equivalent. Offered alternate years.

Lecs, T R 11:15; lab, R 1:25–4:25; two all-day Saturday 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.

**334 (314) Agricultural Meteorology** Spring. 3 credits. Limited to 35 students.

T R 10–11:25. A. B. Pack. An introduction to 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. Moisture relationships in the atmosphere-soil-plant continuum, the effects of environmental modification, and the bioclimatic requirements of plants are also discussed.

**335–336–337–338 (325–326–327–328)**

**Meteorological Communications** 335 and 337, fall; 336 and 338, spring. 1 credit each semester. Primarily for undergraduate meteorology majors. S-U grades optional.

Hours to be arranged. Staff. The student becomes acquainted with facsimile, teletype, and satellite receiving equipment and the data products used in weather forecasting.

**360 (300) Earth Resources Inventories** Spring. 3 credits.

Lecs, M W 12:20; lab, M T 2. E. E. Hardy. Procedures for inventorying resources, the methods used, and theories of inventory development in relation to present needs. Examination of the processes used in generating currently used inventories, application of methods to improve existing inventories, and experience in developing inventories. Land-resource inventories are emphasized.

**361 (301) Genesis, Classification, and Geography of Soils** Fall. 4 credits. Prerequisite: Agronomy 260 or consent of instructor. S-U grades optional.

Lec, M W F 10:10; lab, W 1:25–4:25; all-day field trip required. R. B. Bryant.

The soil as a natural body. Factors and processes of soil formation. Principles of field identification, classification, survey, and interpretation. Geography of major kinds of soil of North America and the world in relation to environment and cultural patterns. Laboratory exercises and field trips assist in identifying and interpreting soils in relation to landscape.

**362 (302) Soil Morphology** Fall. 1 credit.

Prerequisite: Agronomy 260 or consent of instructor. R 1:25–4:25; all-day field trip required.

R. B. Bryant.

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.

**366 (306) Soil Chemistry** Spring. 3 credits

Prerequisite: Agronomy 260, and Chemistry 207–208.

M W F 9:05. M. B. McBride.

An introduction to the chemical nature and reactions of the mineral and organic components that comprise soils.

**368 (308) Soil Chemistry Laboratory** Spring

2 credits. Prerequisite: Agronomy 260, Chemistry 207–208, and Agronomy 366. Can be taken concurrently with Agronomy 366.

R 1:25–4:25. M. B. McBride.

Laboratory exercises are designed to measure soil-chemical properties using wet chemical and spectrophotometric methods. A weekly discussion period will follow each laboratory.

**[371 (321) Soil and Water Conservation** Spring.

2 credits. Prerequisites: Agronomy 260 and concurrent registration in Agricultural Engineering 321. S-U grades optional. Not offered 1983–84.

M W 8. Staff.

A study of the principles and practices used in soil and water conservation, agronomic aspects of erosion control, water management, storage, drainage, and irrigation.]

**372 (324) Soil Fertility Management** Fall.

3 credits. Prerequisite: Agronomy 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.

**373 (331) Aquatic Plant Management** Fall.

3 credits. Prerequisites: Biological Sciences 101–102 and Chemistry 103–104 or equivalents.

T R 11:15; T 1:25–4:25. J. H. Peverly.

The chemistry and physiology of higher aquatic plants are studied from the inorganic solid, solution, and gaseous phases of the environment to cellular and subcellular levels of plants. Application of the basic physical and chemical concepts presented to predict effects on aquatic plant management are illustrated in laboratory and field situations.

**441–442 (411–412) Theoretical Meteorology I and II** Fall and spring. 3 credits each semester.

Prerequisites: a year each of calculus and physics. M W F 10:10. W. W. Knapp.

Fall semester topics include thermodynamics of dry air, water vapor and moist air, hydrostatics and stability. Topics considered in the spring term include meteorological coordinate systems, variation of wind and pressure fields in the vertical, winds in the planetary boundary layer, surfaces of discontinuity, mechanisms of pressure change, vorticity and circulation.

**[447 (417) Physical Meteorology** Fall. 3 credits.

Prerequisite: a year of each of calculus and physics. Offered alternate years. Not offered 1983–84.

M W F 12:20. 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.]

**450 (430) Synoptic Meteorology I** Fall. 4 credits.

Prerequisites: either Agronomy 441 and 442 or permission of instructor.

Lecs, W R 9:05; lab, F 2:30–4:25. D. A. Paine.

The application of quasi-geostrophic theory as a diagnostic and forecast method, including the use of minicomputer products derived from the barotropic, baroclinic, and primitive equation numerical models. Laboratory work includes surface and upper-air analyses and thickness and vorticity computations using radiosonde data documenting macro-scale cyclogenesis.

**452 (432) Synoptic Meteorology II** Spring

4 credits. Prerequisite: Agronomy 450 or permission of instructor.

Lecs, W F 1:25; lab, R 2:30–4:25. D. A. Paine.

The conservation laws for mass, energy, and momentum in constant entropy coordinates. Derivation and construction of adiabatic versus diabatic trajectories. Ertel's potential vorticity theorem evaluated by the quasi-Lagrangian trajectory technique. The laboratory employs the Agronomy 450 storm data to contrast constant pressure and isentropic methods of analysis.

**454 (464) Biometeorology** Spring. 2 credits

Prerequisite: permission of the instructor.

Lec, W 1:25; lab, W 2:30–4:25. Staff.

Interactivity between the atmosphere and biosphere is of central concern when considering many of the challenges of this decade, such as acid rain, severe winter cold stress, fossil-fuel burning, and CO<sub>2</sub> increase. Empirical and theoretical models of such interactivity are presented. A systems-level approach to environmental protection decisions is emphasized.

**471 (401) Geography and Appraisal of Soils of the Tropics** Spring. 3 credits. Prerequisite:

Agronomy 260 or equivalent. S-U grades optional.

Lecs, W F 12:20; disc, F 2:30–4:25.

A. Van Wambeke.

The character of principal kinds of soils in the major regions of the tropics. Soil properties are related to the position in the landscape and to profile genesis. Emphasis is on soil properties as a basis for interpretation of crop management requirements and production potential. Lectures introduce principles whose applications are examined through discussions, problem solving, and independent reading.

**473 (403) Organic Soils** Fall. 2 credits.

Prerequisite: Agronomy 260. Offered alternate years.

W 1:25–4:25; some field trips will not return before 5:30. J. M. Duxbury.

A combination of field and laboratory study and discussion of the genesis, physical and chemical properties, agricultural uses, and management of organic soils.

**474 (404) Forest Soils** Fall. 3 credits. Prerequisite:

Agronomy 260 or permission of instructor.

Lecs, T R 8, lab, M or T 1:25–4:25; some field trips may not return before 5:30. S. J. Riha.

Ecology of forest soils. Application of basic physical and chemical principles to the study of energy, water, and nutrient budgets of forest ecosystems. Implications for forest management.

**476 (406) Soil Microbiology, Lectures** Spring

3 credits. Prerequisite: Agronomy 260 or Microbiology 290. Offered alternate years.

M W F 10:10. M. Alexander.

A study of the major groups of soil microorganisms, their ecological interrelationships, and the biochemical functions of organisms in soil.



**480 Management Systems for Tropical Soils**

Spring. 3 credits. Prerequisite: Agronomy 471 or permission of instructor. S-U grades optional. Offered alternate years.

Lec, W F 8; disc, W 2:30–4:25. A. Van Wambeke. Land evaluation in tropical areas; water requirements in semiarid tropics. Management of tropical soils in relation with nitrogen, acidity, liming, phosphorus, and other nutrients. Effects of cropping systems on soils, soil conservation methods, and erosion control.

**482 Transfer Processes in Soil** Spring. 4 credits. Prerequisite: Agronomy 260 or equivalent.

Lecs, M W F 11:10–12; disc to be arranged. R. J. Wagenet.

An introduction to basic principles of water movement in saturated and unsaturated soil, evapotranspiration, gas and heat flow, and solute transport. Applications are considered through discussions and problem sets.

**[486 (466) Microbial Ecology** Spring 3 credits. Prerequisite: an elementary course in some facet of microbiology. Offered alternate years. Not offered 1983–84.

M W F 10:10. M. Alexander.

An introduction to the basic principles of microbial ecology. Attention is given to the behavior, activity, and interrelationships of bacteria, fungi, algae, and protozoa in natural ecosystems.]

**497 Special Topics** Fall or spring. 1–6 credits. S-U grades optional. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work and assign the grade.

Hours to be arranged. Staff.

The topics are arranged at the beginning of the term for individual study or for group discussions.

**498 Teaching Experience** Fall or spring.

1–5 credits. S-U grades optional.

Hours to be arranged. Staff.

Teaching experience in crop science, meteorology, or soil science is obtained by assisting in the instruction of a departmental course.

**499 Undergraduate Research** Fall or spring.

Credit to be arranged. Written permission from the staff member who will supervise the work and assign the grade must be attached to course enrollment material.

Hours to be arranged. Staff.

Independent research on current problems selected from any phase of crop science, meteorology, or soil science.

**566 (506) Use of Soil Information and Maps as Resource Inventories** Fall. 2 credits. S-U grades optional. For anyone interested in using soils. Offered alternate years.

T R 11:15. G. W. Olson.

Principles, practices, and research techniques in interpreting soil information and maps for planning, developing, and using areas of land

**[608 Water Status in Plants and Soils** Fall

2 credits. Prerequisite: permission of instructor. S-U grades optional. Offered alternate years. Not offered 1983–84.

Lec, 1 hour to be arranged; lab, R 1:25–4:25 or as arranged. R. D. Miller, T. L. Setter.

Techniques for field appraisal of the status of water in plants and soil, including methods used in evapotranspiration studies.]

**610 Physiology of Environmental Stresses**

Spring. 3 credits. Prerequisite: Biological Sciences 242 or 341. Offered alternate years.

Lecs, T R 10:10. P. L. Steponkus.

A study of the responses of plants to environmental stresses, including chilling, freezing, high temperature, and drought. Emphasis is on the physiological and biochemical basis of injury and plant resistance mechanisms at the whole-plant, cellular, and molecular levels.

**611 Crop Simulation Modeling** Fall. 3 credits

Prerequisite: Biological Sciences 242 or 341. Recommended: computer programming experience. Offered alternate years.

M W F 11:15. G. W. Fick.

A study of existing crop models is followed by development and refinement of programs representing the students' work. The computer language CSMP is used. Emphasis is on quantitative formulation and testing of complex hypotheses related to crop growth. Carbon exchange, transpiration, microclimate, soil water supply, root functions, and dry-matter distribution in growing crops are covered.

**612 Grain Formation** Spring 3 credits

Prerequisite: plant physiology.

M W F 12:20. 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. Coverage ranges from practical, "on-farm" problems to molecular biology.

**613 Ecology and Physiology Yield** Fall. 3 credits.

Prerequisite: plant physiology.

M W F 8. 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.

**[663 (603) Pedology** Spring. 3 credits.

Prerequisite: Agronomy 361 or consent of instructor. Offered alternate years. Not offered 1983–84.

T R 10:30–12. 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.]

**666 (606) Advanced Soil Microbiology** Fall.

1 credit. Prerequisite: Agronomy 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.

**[667 (607) Soil Physics** Fall. 3 credits.

Prerequisites: Agronomy 260 and a year of college physics or permission of instructor. Offered alternate years. Not offered 1983–84.

M W F 11:15. R. D. Miller.

A study of physical properties and processes in soils, with emphasis on basic principles.]

**669 (609) Soil Organic Matter** Fall. 2 credits

Prerequisites: Agronomy 260 and Chemistry 357–358 or equivalent. Offered alternate years.

T R 9:05. J. M. Duxbury.

A discussion of current concepts of the nature, mode of formation, dynamics, and role of organic matter in soils. Some consideration is given to the behavior of manufactured organic chemicals in the soil environment.

**670 Applications of Soil Physics** Spring.

3 credits. Prerequisites: Agronomy 482 or equivalent, and calculus. Offered alternate years.

Three lectures per week. Hours to be arranged.

R. J. Wagenet.

Discussion of soil water and solute movement under field conditions. Development of models that include transport, interaction, and transformation of solutes. Consideration of spatial variability of soil properties and how to treat it quantitatively.

**[771 (701) Soil Chemistry and Mineralogy** Fall

3 credits. Prerequisites: Agronomy 260 and a year of physical chemistry, or permission of instructor. Offered alternate years. Not offered 1983–84.

M W F 9:05. M. B. McBride.

Chemical properties of soils, with emphasis on structure and surface chemistry of soil minerals, ion exchange, mineral-solution equilibria, and adsorption reactions of soil clays and oxides.]

**774 (724) Soil Fertility Advanced Course** Spring.

3 credits. Prerequisite: graduate status with a major or minor in agronomy. Offered alternate years.

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.

**790 Agronomy Seminar** Fall or spring. No credit

Required of graduate students majoring or minoring in the department.

T 4.

**791 (691) Meteorology Seminar** Fall or spring

Prerequisite: permission of instructor.

Hours to be announced. Staff.

Subjects such as weather modification, paleoclimatology, and atmospheric pollution.

**829 Masters-Level Thesis Research in Crop Science** Fall or spring. Credit by arrangement.

Limited to students in the graduate field.

Hours by arrangement.

**859 Masters-Level Thesis Research in Meteorology** Fall or spring. Credit by arrangement.

Limited to students in the graduate field.

Hours by arrangement.

**889 Masters-Level Thesis Research in Soil Science** Fall or spring. Credit by arrangement.

Limited to students in the graduate field.

Hours by arrangement.

**929 Doctoral-Level Thesis Research in Crop Science** Fall or spring. Credit by arrangement.

Limited to students in the graduate field.

Hours by arrangement.

**959 Doctoral-Level Thesis Research in Meteorology** Fall or spring. Credit by arrangement.

Limited to students in the graduate field.

Hours by arrangement.

**989 Doctoral-Level Thesis Research in Soil Science** Fall or spring. Credit by arrangement.

Limited to students in the graduate field.

Hours by arrangement.

**Related Courses in Other Departments****Forages of the Tropics for Livestock Production (Animal Sciences 403)****Special Studies of Problems of Agriculture in the Tropics (International Agriculture 602)****Protozoan Parasite Structure and Function (Veterinary Medicine 765)****Animal Sciences**

**Department of Animal Science:** R. J. Young, chairman; H. R. Ainslie, B. J. Apgar, D. E. Bauman, D. H. Beermann, R. D. Boyd, W. R. Butler, L. E. Chase, W. B. Currie, T. R. Dockerty, J. M. Elliot, R. W. Everett, H. N. Erb, R. H. Foote, D. G. Fox, J. A. Fitzgerald, D. M. Galton, R. C. Gorewit, W. Hansel, H. F. Hintz, D. E. Hogue, R. E. McDowell, W. G. Merrill, E. A. Oltenacu, P. A. Oltenacu, R. L. Quaas, J. B. Russell, S. W. Sabin, H. F. Schryver, R. D. Smith, C. J. Sniffen, J. R. Stouffer, M. L. Thonney, D. R. Van Campen, N. L. VanDemark, P. J. Van Soest, L. D. VanVleck, R. G. Warner

**Department of Poultry and Avian Science:**

R. C. Baker, chairman; R. E. Austic, S. E. Bloom, G. F. Combs, Jr., D. L. Cunningham, R. R. Dietert, K. Keshavarz, H. G. Ketola, C. C. McCormick, J. A. Marsh, J. M. Regenstien, G. L. Rumsey, E. A. Schano, A. van Tienhoven

**100 Introductory Animal Science** Fall. 3 credits  
For beginning students. S-U grades optional.

Lecs, W F 10:10; lab, T R or F 2-4:25. J. M. Elliot. An introduction to animal science dealing with domestic animals and with current practices and problems of the livestock and meat industries. The place of the physical and biological sciences in animal agriculture is discussed. Emphasis is on the nutrition, physiology, breeding, and management of dairy cattle, beef cattle, sheep, swine, and horses.

**105 Contemporary Perspectives of Animal Science** Spring. 1 credit. Limited to freshmen, sophomores, and first-year transfers.

T 1:25, W 12:20. Staff.  
A forum to discuss the contemporary and future role of animals in relation to human needs and career planning.

**112 Livestock Nutrition** Spring. 4 credits.

Prerequisite: Chemistry 103 or 207. Recommended: Animal Science 100.

Lecs, M W F 10:10; lab, M T W R or F 2-4:25. R. G. Warner.

An introduction to animal nutrition covering fundamentals of nutrition, the nutritive value of feeds, and the application of feeding standards to various forms of production in dairy and beef cattle, sheep, swine, and horses.

**113 Nutrition of Companion Animals** Fall, weeks 1-7. 1 credit. Prerequisite: Animal Science 112 or equivalent. S-U grades optional.

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.

**200 Animal Physiology** Fall. 3 credits. Limited to sophomores and juniors except with permission of instructor. Prerequisite: a year of college biology. High-school level chemistry, physics, and math is assumed.

Lecs, M W F 9:05. W. B. Currie.  
A general introduction to animal physiology, with emphasis on developing physiologic concepts and an understanding of animal function in physiologic terms. Where suitable, examples are taken from ruminants or other domestic animals. Lectures and demonstrations are designed to encourage independent supportive study. This course provides a basis for more specialized physiology courses in animal science and supports the study of nutrition and the production courses. A major paper on a free-choice topic in physiology is required.

**220 Animal Reproduction and Development** Spring. 4 credits. Each lab limited to 36 students.

Prerequisite: a year of college biology or equivalent.  
Lecs, T R 9:05; demonstration and lab, M T W or R 2-4:25 or T 10:10-12:35 or F 12:20-2:45. R. H. Foote.

An introduction to the comparative anatomy and physiology of reproduction of farm animals. The life cycle from fertilization through development and growth to sexual maturity is studied, with emphasis on physiological mechanisms involved, relevant genetic control, and application to fertility regulation of animal and human populations. An audiotutorial laboratory is available for independent study to prepare for laboratory experiments.

**221 Introductory Animal Genetics** Fall. 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.

**230 Poultry Biology** Spring. 3 credits

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.

**250 Dairy Cattle** Fall. 3 credits. S-U grades optional.

Lecs, T R 10:10; lab, M T R 1:25-4. D. M. Galton.  
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 Science 455.

**251 Dairy Cattle Selection** Spring. 2 credits.

Prerequisite: Animal Science 250 or equivalent.  
Lab, W 12:20-4:25. 1 all-day S field trip. D. M. Galton.

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.

**265 Horses** Spring. 3 credits. Prerequisite: Animal Science 100 or permission of instructor. S-U grades optional.

Lecs, T R 10:10; lab, R 1:25-4:25. H. F. Hintz, J. E. Lowe.  
Selection, management, feeding, breeding, and training of light horses.

**290 Meat Science** Fall. 3 credits.

Lecs, T R 8; lab, M T or W 1:25-4:25. J. R. Stouffer.  
An introduction to meat science through a study of the characteristics of meat from slaughter to consumption. Structure, composition, inspection, grading, preservation, cutting, and processing are included. An all-day field trip to commercial meat plants is taken.

**321 Seminar on Genetics of the Horse** Spring. 1 credit. Prerequisite: Animal Science 265 or permission of instructor. Recommended: Animal Science 221 or Biological Sciences 281.

T or W 9:05. L. D. VanVleck.  
A discussion of genetics of the horse, with special reference to simply inherited traits and selection for quantitative traits.

**330 Commercial Poultry Production** Fall. 2 credits. Prerequisite: Animal Science 100, 230, or permission of instructor. Offered alternate years.

F 2-4:25. Field trips. D. L. Cunningham.  
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.

**331 The Chicken in Biological Research** Fall. 2 credits. Prerequisite: one year of biology. S-U grades only.

Lecs, T R 11:15. C. C. McCormick.  
Faculty members will present lectures on the use of the chicken in biological research in the past and present and will supervise preparation of seminars to be given by students on the future use of the chicken in biological research.

**340 Systems Analysis in Animal Production** Fall. 2 credits. Prerequisite: Animal Science 100.

Recommended: Animal Science 250 or equivalent.  
Lecs, T R 10:10. P. A. Oltenacu.  
All-embracing systems concepts are applied to animal production management. The emphasis is on the principles and techniques needed in decision-

making activities with examples of tactical decisions (short term) and strategic decisions (long term) from dairy herd management.

**360 Beef Cattle** Spring. 3 credits. Prerequisite: Animal Science 100, 112, 220, 221, or permission of instructor.

Lecs, T R 10:10; lab, W R 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 of a beef operation. Students are required to spend several days during the semester feeding, observing calving, and caring for cattle. One all-day field trip is taken to visit beef operations in central New York.

**370 Swine Production** Fall. 3 credits. Limited to 85 students; each lab limited to 45 students.

Prerequisite: Animal Science 112, 220, 221 or permission of instructor.  
Lecs, T R 11:15; lab, T or W 2-4:25. R. D. Boyd.  
The objective is to provide an opportunity to acquire practical knowledge and a technical basis for decisions in various types of swine enterprises. Emphasis on the various production systems, selection and breeding programs, reproductive management, nutrition, herd health, and housing facilities. Laboratories are designed to extend and apply principles discussed in lecture and to provide students with the opportunity to apply management skills.

**380 Sheep** Fall. 3 credits. Prerequisite: Animal Science 100. Recommended: Animal Science 112, 220, and 221.

Lec, T R 10:10; lab and disc periods, M 1:25-4:25 every other week. D. E. Hogue.  
The breeding, feeding, management, and selection of sheep. Lectures and laboratories are designed to give the student a practical knowledge of sheep production as well as the scientific background for improved practices.

**390 Meat Animal Growth and Evaluation** Spring. 2 credits. Prerequisite: Animal Science 100 or permission of instructor.

Lec and lab, W 1:25-4:25. D. H. Beermann.  
Fundamental biological principles that influence growth and composition are presented. Principles and techniques of meat animal and carcass evaluation are discussed and followed by student participation.

**\*400 Livestock Production in Warm Climates** Spring. 3 credits. Prerequisite: either Animal Science 112, 220, or 221 or permission of instructor.

Lecs, T R 9:05; disc W 1:25-3:20. R. E. McDowell.  
An analysis of the limitations the tropical environment imposes on livestock production; restrictions on contributions of animals to farm incomes owing to limitations in genetic potential; feed resources; and social structures. The role of animals on small farms and the interdependence of humans and animals for food, services, and nonfood products are stressed. The application of principles introduced in lectures is examined through discussions, problem solving, and independent study.

**401 Dairy Production Seminar** Spring. 1 credit. Limited to juniors and seniors.

Disc, M 7:30 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.

**402 Seminar in Animal Science** Spring. 1 credit. Limited to juniors and seniors. May be repeated. S-U grades optional.

Hours to be arranged. L. D. VanVleck and staff.  
Review of literature pertinent to topics of animal science or reports of undergraduate research and honors projects. Students present oral and written reports.

**403 Forages of the Tropics for Livestock**

**Production** Spring. 3 credits. Limited to seniors and graduate students except by permission of instructor. Prerequisites: crop production and livestock nutrition. Offered alternate years.

Lecs, T R 12:20; disc, T 1:25. V. E. Gracen, R. E. McDowell, P. J. VanSoest.

A review of tropical grasslands, sown pastures, and fodders and their use as feed resources; grass and legume characteristics; establishment and management of pastures and feed source alternatives; forage quality and utilization; problems of utilization of tropical forages as hays and silages.

**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. 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.

**415 Poultry Nutrition**

Spring. 1 credit. Prerequisite: Animal Science 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.

**418 Mutagenesis and Genetic Toxicology (also Toxicology 418)**

Spring. 2 credits. Prerequisites: introductory courses in genetics or biochemistry or permission of instructor. Offered alternate years.

Lec, W 7-9 p.m. S. E. Bloom.

A study of the alterations in the genetic material of animals and man by natural and man-made chemicals. Topics include attack on DNA by mutagens, repair of DNA lesions, gene and chromosome mutation, spindle poisons, mutations and cancer, genetic toxicology testing and risk assessment.

**419 Animal Cytogenetics (also Toxicology 419)**

Fall. 4 credits. Prerequisites: Animal Science 221, Biological Sciences 281, or permission of instructor.

Lec, T R 9:05; lab, T or W 1:25-4:25; 2 other hours to be arranged. S. E. Bloom.

A study of normal and abnormal chromosomes in higher animals. Lecture topics include chromosome organization, chromosome movement, cytogenetics of abortuses, parthenogenesis, chromosomes and cancer, mitotic and meiotic errors, and human clinical cytogenetics. In laboratories, students obtain chromosome preparations from various animals and use cytochemical and photographic methods for karyotype analysis.

**420 Quantitative Animal Genetics**

Fall. 3 credits.

Lecs, T R 11:15; lab, W R or F 2-4:25.

L. D. VanVleck.

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.

**421 Seminar in Animal Genetics**

Fall. 1 credit. Prerequisite: Animal Science 221 or concurrent registration in Animal Science 420.

Hours to be arranged. L. D. VanVleck, R. W. Everett.

A discussion of applications of principles of quantitative genetics and animal breeding to specific types of animals such as dairy animals, meat animals, and horses.

**422 Research Techniques in Quantitative Animal**

**Genetics** Fall. 1 credit. Prerequisite: Animal Science 420 or concurrent registration in Animal Science 420.

R 12:20. L. D. VanVleck.

An introduction to methods of research in quantitative genetics and animal breeding, including estimation of heritability, repeatability, and genetic and phenotypic correlations.

**427 Fundamentals of Endocrinology**

Fall. 3 credits. Prerequisite: human or veterinary physiology, or permission of instructor.

Lecs, M W F 9:05. W. R. Butler.

The physiology of the endocrine glands and the roles played by each hormone in the regulation of normal body processes. Endocrine regulation of growth, metabolism, and reproduction is emphasized. Examples are selected from domestic species and humans.

**428 Fundamentals of Endocrinology, Laboratory**

Fall. 2 credits. Each lab limited to 30 students. Concurrent registration in Animal Science 427 or permission of instructor.

Lab, T or R 1:25-4:25. W. R. Butler.

Laboratory exercises are designed to demonstrate hormonal mechanisms for each of the major endocrine glands. Laboratory techniques include animal surgery, blood collection, and hormone radioimmunoassay.

**430 Artificial Breeding of Farm Animals**

Fall, starting August 17. 2 credits. Prerequisites: Animal Science 220 and 221 or their equivalent. Permission of instructor must be obtained at course enrollment.

Lecs, T R 9:05 first seven weeks. Labs: M T W R F 8:30-4:30; sec 1, Aug. 17-23; sec 2, Aug. 24-30. R. H. Foote.

Principles of artificial breeding and practical animal and laboratory experience in semen collection, semen evaluation, semen freezing, and artificial insemination of farm animals.

**450 Immunophysiology**

Spring. 3 credits. Prerequisite: course work in immunology and animal physiology or permission of instructor.

Lecs, M W F 11:15. J. A. Marsh.

Emphasis on the development and regulation of the immune system and the physiological parameters affecting and affected by immune functioning. Major topics include development immunology, immunoregulation, immunological involvement in reproduction and gonadal function, interrelationships between immune and endocrine functioning, and the immunology of aging. Other topics include tumor and transplantation immunology and autoimmune disease.

**451 Lactation Biology**

Spring. 3 credits. Prerequisite: either Animal Science 220 and Biological Sciences 231 or permission of instructor.

Lecs, T R 9:05; lab, R 2-4:25. R. C. Gorewit.

Emphasis is on mammary gland development, anatomy, physiological control of milk secretion, and biochemical synthesis of milk constituents in laboratory and farm animals.

**452 Comparative Physiology of Reproduction of Vertebrates (also Biological Science 452)**

Spring. 3 credits. Prerequisite: Animal Science 427 or permission of instructor.

Lecs, M W F 1:25. One prelim at 7:30 p.m.

A. van Tienhoven.

Sex and its manifestations. Neuroendocrinology of reproduction, sexual behavior, gametogenesis, fertilization, embryonic development, care of the zygote environment and reproduction, immunological aspects of reproduction.

**454 Comparative Physiology of Reproduction of Vertebrates, Laboratory (also Biological Sciences 454)**

Spring. 2 credits. Prerequisite: Animal Science 452, concurrent registration in Animal Science 452, or permission of instructor.

Hours to be arranged; organizational meeting

F 2:30 first week of semester. A. van Tienhoven.

Provides students with an opportunity to independently design and execute experiments with limited objectives.

**455 Dairy Herd Management**

Spring. 4 credits. Prerequisite: Animal Science 112, 220, 221, 250, or equivalents. Recommended: Agricultural Economics 302.

Lecs, M W F 11:15; Lab, M T 1:25-4:25; one all-day field trip. W. G. Merrill and staff.

Application of scientific principles to practical herd management, analyses of alternatives, and decision making. Laboratories, including farm visits, emphasize practical applications, problem solving, and discussion.

**486 Immunogenetics (also Biological Sciences 486)**

Spring. 4 credits. Limited to 25 students. Prerequisites: a course in immunology and Animal Science 221 or Biological Sciences 281, or permission of instructor.

Lecs, M W F 10:10; disc, W or R 12:20.

R. R. Dietert.

The genetic control of a variety of cellular antigens and their use in understanding biological and immunological functions. The genetics of antibody diversity, antigen recognition, immune response, transplantation, and disease resistance.

**490 Commercial Meat Processing**

Spring. 3 credits. Prerequisite: Animal Science 290 or permission of instructor. Offered alternate years.

Lecs, T R 9:05; lab, T or R 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 methodologies; microbiology; packaging, handling, and storage; and quality assurance are discussed.

**497 Special Topics in Animal Sciences**

Fall or spring. 1-3 credits. Intended for students in animal sciences. Prerequisite: permission of instructor. 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.

**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.

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.

**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. 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.

**600 Research**

Fall or spring. Credit to be arranged. S-U grades optional.

Hours to be arranged. All members of animal science program area.

**601 Proteins and Amino Acids in Nutrition (also Nutritional Sciences 601)** Fall. 2 credits.

Prerequisites: physiology, biochemistry, and nutrition, or permission of instructors.

W F 11:15. R. E. Austic, M. Morrison.

An advanced course in amino acid and protein nutrition, with emphasis on the dynamic aspects of protein digestion, amino acid absorption, protein synthesis, amino acid metabolism, and nitrogen excretion. Discussions include nutritional interrelationships, amino acid and protein requirements, assessment of nutritional status, evaluation of protein quality, bioavailability of amino acids, and techniques of amino acid analysis. Emphasis is on basic principles and their application in animal and human nutrition.

**604 Vitamins** Fall. 2 credits.

T R 10:10. G. F. Combs, Jr.

A discussion of the chemistry, biochemistry, and physiological functions of the vitamins, with emphasis on nutritional aspects.

**605 Forage, Fiber, and the Rumen** Spring

4 credits. Prerequisites: either general nutrition and biochemistry or permission of instructor.

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.

**607 Microbiology of the Rumen** Spring. 3 credits.

Prerequisites: general biochemistry and microbiology.

Lecs, M W F 10:10. J. B. Russell.

Nutrition, biochemistry, physiology, taxonomy, and ecology of rumen bacteria and protozoa. Effects of rumen microbial ecology on ruminant nutrition. Manipulation of rumen fermentations to maximize host-animal performance.

**609 Seminar in Poultry Biology** Fall or spring

Limited to graduate students. S-U grades only.

Hours to be arranged. Staff.

A survey of recent literature and research in poultry biology.

**610 Seminar** Fall and spring. 1 credit. Required of all graduate students with a major or minor in animal science. S-U grades only.

M 11:15. Department faculty.

**613 Forage Analysis** Spring. 2 credits.

Prerequisite: permission of instructor.

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.

**619 Field of Nutrition Seminar** Fall or spring. No credit.

M 4:30.

Current research in nutrition is presented by visitors and faculty.

**620 Seminar in Animal Breeding** Fall or spring.

1 credit. Limited to graduate students with a major or minor in animal breeding. S-U grades only.

Hours to be arranged.

**621 Seminar in Reproductive Physiology** Fall and spring. 1 credit. Registration limited to graduate students. Advanced undergraduates welcome to attend. S-U grades only.

W 4:30. R. H. Foote and staff.

Current research in reproductive physiology is presented by staff members, graduate students, and visitors.

**640 Special Topics in Animal Science** Fall or

spring. 1 or more credits.

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.

**720 Experimental Methods in Quantitative Genetics and Animal Breeding** Spring. 3 credits.

Prerequisites: matrix algebra, linear models, and mathematical statistics.

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)****Special Studies of Problems of Livestock Production in the Tropics (International Agriculture 602)****Lipids (Nutritional Sciences 602)****Poultry Hygiene and Disease (Veterinary Medicine 255)****Basic Immunology, Lectures (Veterinary Medicine 315)****Basic Immunology, Laboratory (Veterinary Medicine 316)****The Population Biology of Health and Disease (Veterinary Medicine 330)****Health and Diseases of Animals (Veterinary Medicine 475)****Biological Sciences**

The program of study in biology is offered by the Division of Biological Sciences. For course descriptions, see pp. 224-237.

**Communication Arts**

N. E. Awa, D. Berlo, R. D. Colle, B. O. Earle, S. Engstrom, C. H. Freeman, G. Gay, D. A. Grossman, J. E. Hardy, J. E. Lawrence, R. D. Martin, R. E. Ostman, T. M. Russo, D. F. Schwartz, M. A. Shapiro (on leave), R. E. Shew, V. R. Stephen, P. Stepp, R. B. Thompson, W. B. Ward, S. A. White, A. M. Wilkinson, P. Yarbrough

**[114 Writing in the Biological Sciences** Fall or spring. 3 credits. Freshman Seminar designed for College of Agriculture and Life Sciences students. Concurrent registration is required in Biological Sciences 101-102, 103-104, 105-106, or 109-110. Not offered 1983-84.

Factual, informative writing based on information and laboratory experiences in biology. Emphasis on writing rather than subject matter and on objective observation rather than subjective personal experience. Discussion of effective sentence and paragraph structure, organization, usage, grammatical structure, meaning of words, and punctuation. Objective is clear, concise, concrete writing.]

**150 Writing for Media** Fall or spring. 3 credits.

Limited to new communication arts majors—freshmen and transfers. Labs limited to 18 students.

Lec, M F 12:20; lab 1, W 12:20-2:15; lab 2, W 2:30-4:25. Staff.

Basic writing for print and broadcast. A back-to-basics approach to writing for clarity and style, using news and feature writing as a framework. Media form and style are analyzed. Frequent writing assignments, both in and outside of class, are given. Typing skill required.

**200 Theories of Human Communication** Fall,

spring, or summer. 3 credits. S-U grades optional. Not open to first-semester freshmen.

Lecs, T R 12:20; disc, T or R 1:25. R. B. Thompson and staff.

An introduction to human communication from a multidisciplinary perspective. Contributions from philosophy, psychology, neurology, social psychology, linguistics, anthropology, and communication theory are considered.

**204 (304) Effective Listening** Fall or spring

3 credits. Limited to 25 nonfreshman students per section. Preference given to sophomores. No students accepted or allowed to drop after the second week of classes. Letter grades only.

Lec 1, M 2:30; lab 1, T 9:05-11; lab 2, W 9:05-11; lab 3, W 12:20-2:15; lab 4, R 9:05-11.

R. D. Martin.

Lecture, discussion, and demonstrations are used to present an analysis of the process of listening, including barriers to effective listening and techniques for improving listening skills. Students will participate in frequent skill-building exercises and tests of listening involving comprehension and retention.

**205 Parliamentary Procedure** Fall or spring.

3 credits. Each section is limited to 40 nonfreshman students. No adds or drops allowed after the second week of classes. Letter-grade only.

Lec, M 12:20; sec 1, T 2:30-4:25; sec 2, R 2:30-4:25. R. D. Martin.

A detailed study of the principles and rules of parliamentary procedure using *Robert's Rules of Order*, newly revised, as the text. Emphasis on practical experience and the importance of a well-run meeting as an integral component of effective communication. Includes outside meeting evaluations; preparation of bylaws; and practice in serving as a presiding officer, secretary, and committee member in a simulated meeting situation.

**215 Introduction to Mass Media** Fall or spring. 3 credits. Limited to 125 nonfreshman students. S-U grades optional.

Fall: lec, W F 1:25; disc, M 1:25. Spring: lec, W F 11:15; disc, M 11:15. Fall, R. E. Ostman; spring, J. P. Yarbrough.

History, processes, philosophies, policies, and functions of United States communication media. Each major medium is examined individually in regard to information processing and persuasion. Effects of messages, regulation of media, and other contemporary issues are examined.

**230 Visual Communication** Fall. 3 credits. Limited

to 100 nonfreshman and communication arts freshman students. Not recommended for art or design majors. Project materials cost about \$20-\$30.

M W F 9:05. V. R. Stephen.

A basic course in the use and importance of visual communication methods and materials in today's society. Posters, charts, displays, photographs, slides, overhead projection, motion pictures, and television are among the topics discussed. Practical projects are assigned.

**231 Art of Publication** Spring. 3 credits. Each section limited to 30 nonfreshman students. Project materials cost \$30-\$50.

M or W 1:25-4:25. V. R. Stephen.

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, a field trip, in-class assignments, and three outside projects examine opportunities and problems in publication design and production.

**301 Oral Communication** Fall, spring, or summer. 3 credits. Each section limited to 24 sophomores, juniors, and seniors. Students missing the first week of classes without a University excuse are dropped so that others may register. No students accepted or allowed to drop after the second week of classes. Letter grades only.

Disc, M W F 8, 9:05, 10:10, 11:15, or 12:20; T R 9:05 and W 12:20; T R 9:05 and W 1:25; T R 9:05 and W 2:30; T R 10:10 and W 12:20; T R 10:10 and W 1:25; T R 10:10 and W 2:30; T R 11:15 and W 12:20; T R 11:15 and W 2:30; M 12:20 and T R 9:05; M 12:20 and T R 10:10; M T W 12:20; M T W 1:25; or T W R 3:35. Fall: evening prelim, Nov. 15. B. O. Earle, T. M. Russo, P. Stepp, R. B. Thompson, and staff. A study of the basic process and principles of oral communication. Through theory and practice, the student is encouraged to develop self-confidence and competence in public speaking. Provides experience in preparing, delivering, and evaluating oral presentations.

**302 Persuasion** Fall or spring. 3 credits. Prerequisite: Communication Arts 301.

Lec, M 11:15; discs, T R 11:15 or 12:20 or W F 11:15. B. O. Earle. The course concentrates on the analysis and understanding of the persuasion events around us. The oral presentations stress the application of various theories of persuasion to the interpersonal communication process.

**303 Small-Group Communication** Fall. 3 credits. Limited to juniors and seniors. Prerequisite: Communication Arts 200 or permission of instructor. T R 2:30–4. N. E. Awa.

Theory and practice in leadership and participation in small-group communication. The course examines the values and limitations of group discussion, collaborative behavior, and conflicts in a democracy.

**[311 Radio and Television Communication** Fall. 3 credits. Not offered 1983–84.

An overview of the roles of radio and television in contemporary society, with particular emphasis on the development, organization, and influence of these media in the United States. Attention is also given to the structure and uses of radio and television in other nations, to provide perspective on the systems here, and to the techniques and constraints involved in program production.]

**312 Advertising and Promotion** Fall, spring, or summer. 3 credits. In the fall, limited to junior and senior communication arts majors and graduate students. In the spring, for juniors, seniors, and graduate students not majoring in communication arts. S-U grades optional.

Fall: M W 2:30–4:25. Spring: M W 2:30–4. Staff. In the fall, the course emphasizes the planning, creation, production, and measuring of advertisements and advertising campaigns. Lectures and workshops alternate. In the spring, the emphasis is on the role of advertising and promotion in society—how advertising evolved, forms of advertising, research, creative strategies, media, advertising regulations, testing, and advertising organizations. Lectures only, including guest lecturers.

**315 Basic News Writing for Newspapers** Fall and spring. 3 credits. Limited to 30 students. Prerequisite: major in communication or permission of instructor. Typing ability is essential.

Lec, R 1:25–2:20; lab, R 2:30–4:25, plus out-of-class writing assignments. R. E. Shew, director, News Bureau, Cornell University.

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 news writing as it is practiced by newspapers in the United States. Two writing assignments each week, one done in class, one done out of class.

**316 Science Writing for the Mass Media** Fall. 3 credits. No drops after third week. Not open to freshmen. Labs limited to 15 students.

Lec, R 12:20; lab 1, T 12:20–2:15; lab 2, T 2:30–4:25, plus out-of-class writing assignments. Staff.

Writing to explain and simplify scientific and technical topics for newspaper and magazine readers, radio listeners, television viewers, and educational-material consumers. Includes frequent writing assignments. Final projects include writing a newspaper or magazine article, writing a radio program, and writing and producing a television program. Students learn interviewing and research methods that ensure technical accuracy. Students should become familiar with the public policy and institutional milieu that have an effect on science writing and should reflect that knowledge in their writing.

**318 Radio Writing and Production** Spring. 3 credits. Prerequisite: Communication Arts 215 or permission of instructor.

T 1:25–4:25. J. E. Lawrence. Scripting and recording various public information formats for possible use on local and state radio stations. Students create complete broadcasting plans and materials for public and private organizations.

**319 Television Writing and Production** Spring. 3 credits. Limited to 25 students. Prerequisite: Communication Arts 215 or permission of instructor. R 1:25–4:25. J. E. Lawrence.

Creation of television information programs, from development of idea through research, scripting, and production.

**331 Survey Research Methods** Spring. 3 credits. Limited to 20 junior, senior, or graduate majors; others by permission of instructor. Prerequisites: Communication Arts 200, 215, or permission of instructor. M W F 10:10. R. E. Ostman.

Analysis of 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. Instruction in computer use of Statistical Package for the Social Sciences (SPSS) to assist in data analysis. Familiarity with basic statistical concepts helpful.

**360 Scientific Writing for Public Information** Fall, spring, or summer. Not open to freshmen. 3 credits.

Fall: T R 9:05 and W 11:15. Fall and spring: T R 10:10 and W 12:20; M W F 9:05 or 10:10. J. E. Hardy and staff.

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.

**363 Organizational Writing** Fall, spring, or summer. Not open to freshmen. 3 credits.

M W F 9:05 or 12:20; or M 1:25 and T R 11:15. Staff.

Students write as members of different organizations, in the position of supervisor, subordinate, colleague, and representatives 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 case studies.

**365 Writing in the Sciences and Engineering** Fall or spring. 3 credits.

Biological sciences section: M W F 11:15; engineering and physical sciences section: M W F 11:15. A. M. Wilkinson and 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.

**368 Editing** Spring. 3 credits. Limited to 25 junior, senior or graduate students. Prerequisites: one of the following: Communication Arts 315, 316, 360, 363, 365, or 413.

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.

**375 Principles of Public Communication** Fall. 3 credits. Limited to juniors and seniors, or permission of instructor.

M W F 1:25. J. E. Lawrence. Theory, principles, and practices that guide and influence the solutions to public relations problems in agriculture, business, education, government, and social welfare organizations. Examines the process of image formation, public opinion, and developing favorable relationships with the public. Study of public relations as a professional field.

**376 Communication Planning and Strategy**

Spring. 3 credits. Prerequisite: Communication Arts 375 and communication arts major, or permission of instructor.

M W 1:25–3:20. R. Colle. A continuation of Communication Arts 375, Principles of Public Communication, dealing particularly with the communication planning process and developing communication strategies. Using case studies, emphasis is also given to methods and principles for organizing public relations and public information personnel and other resources.

**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. A maximum of 6 credits may be earned in the honors program. Students must use faculty member's section number to register.

**401 Communication Law** Fall. 3 credits. Limited to junior, senior, and graduate communication arts students; others by permission of instructor.

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 licensing, access, and other issues of current interest.

**[403 Topics in Communication Theory** Fall. 3 credits. Prerequisite: Communication Arts 200 or permission of instructor. Offered alternate years. Not offered 1983–84.

Topics in communication theory, determined by the interest of faculty and students, are discussed.]

**404 Psychology of Communication** Spring. 3 credits. Prerequisite: Communication Arts 200 or permission of instructor.

T R 10:10–11:25. Staff.



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.

**410 Organizational Communication** Fall or spring. 3 credits. Limited to 25 junior, senior, or graduate communication arts students; others by permission. Prerequisite: Communication Arts 200 or equivalent.

Lec. M W 9:05; disc. F 9:05–11. D. F. Schwartz and staff.

Study of managerial communication practices in formal organizations, with emphasis on communication between supervisor and subordinate; examination of the structure and function of planned and unplanned organizational communication networks. Case studies assigned for discussion.

**413 Writing for Magazines** Fall or spring. 3 credits. Limited to juniors, seniors, and graduate students. No drops after third week. Extensive out-of-class writing assignments.

Fall: M 1:25–4:25; W. B. Ward. Spring: W F 8:15–9:45; staff.

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.

**420 Print Media Laboratory** Fall. 3 credits. Limited to junior, senior, and graduate communication arts majors. Prerequisite: at least one of Communication Arts 231, 314, 360, or 413.

R 1:25–4:25. J. E. Hardy, V. R. Stephen. Writing, editing, and layout principles practiced in publishing the *Cornell Countryman*. Some additional outside work sessions may be required.

**[421 Broadcast Media Laboratory]** Fall. 2 credits. Limited to junior and senior communication arts majors. Prerequisite: Communication Arts 318 or 319. Not offered 1983–84. Emphasis on production of television and radio programs for various audiences. Course work is done primarily through individual tutorial arrangement.]

**422 Print Media Laboratory** Spring. 3 credits. Limited to junior, senior, and graduate communication arts majors. Prerequisite: Communication Arts 231, 314, 315, 360, or 413.

R 1:25–4:25. J. E. Hardy, V. R. Stephen. A continuation of Communication Arts 420.

**[423 Broadcast Media Laboratory]** Spring. 2 credits. Not offered 1983–84.

Hours to be arranged. A continuation of Communication Arts 421.]

**440 Photo Communication** Fall or spring. 3 credits. Limited to 25 junior and senior communication arts majors; others by permission of instructor. For those with limited experience in photography. Students are expected to furnish their own supplies and cameras. Supplies will cost approximately \$70–\$80.

T 1:25–4:25. C. H. Freeman.

Basic photography: camera handling, film processing, projection printing, and photographic lighting. Photojournalism is emphasized during the latter part of the course.

**[460 Video Communication]** Fall, spring, or summer. 3 credits. Limited to 15 seniors or graduate students. Prerequisites: Communication Arts 200, 230, and permission of the instructor by application. Not offered 1983–84.

Lec. F 12:20–2; lab. F 2–2:50, plus one hour by arrangement. S. White.

An overview of video communication applications. Examination of relevant organizational and visual communication theory. Development of basic competency with portable videotape recording equipment, audio and visual input to video and production, and postproduction planning and editing techniques.]

**496 Internship** Fall, spring, or summer.

1–6 credits. Students must apply to department internship committee no later than spring pre-course enrollment for fall internships, or the fall pre-course enrollment period for spring or summer internships. Prerequisites: communication arts junior or senior, 3.0 average in communication arts courses, and approval of committee.

V. Stephen and staff.

Structured, on-the-job learning experience under supervision of professionals in a cooperating organization. Students select a faculty adviser approved by department internship committee. Faculty adviser supervises the course and the awarding of credit and grade (S-U only). A learning contract is written between the faculty adviser and student, stating the conditions of the work assignment, supervision, and reporting. Minimum of 60 on-the-job hours per credit granted. May be repeated to a maximum of 6 credits.

**497 Independent Study** Fall or spring.

1–6 credits. Undergraduates must attach to their course enrollment material written permission from the faculty member who will supervise the work and assign the grade. Students must use the faculty member's section number to register.

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.

**498 Communication Teaching Experience** Fall or spring. 1–3 credits each semester. Limited to juniors and seniors. Intended for undergraduates desiring classroom teaching experience. 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.

Hours 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.

**499 Independent Research** Fall or spring. 1–6 credits. Limited to senior and graduate students. Seniors must attach to their course enrollment material written permission from the faculty member who will supervise the work and assign the grade. Students must use the faculty member's section number to register.

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.

**601 Intercultural Communication** Spring. 3 credits.

T 1:25–4:25. N. E. Awa.

A systematic analysis of sociocultural and psycholinguistic obstacles to effective communication between cultures, subcultures, and ethnic and identity groups. Also examined are the subtleties and complexities of nonverbal behavior in cross-cultural transactions. Examples are drawn from ethnolinguistic and cross-cultural studies.

**612 Seminar: Interpersonal Communication** Fall 3 credits.

M 1:25–4:25; some classes by arrangement.

D. Berlo.

A study of recent advances and research in leadership, small-group interaction, and communication networks. New developments are examined as they relate to business, administration, and education.

**614 Scientific Writing for Scientists** Fall or spring. 3 credits. Prerequisites: research in progress and permission of the instructor.

T R 8:30–9:55. A. M. Wilkinson.

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, preparation of tables and illustrations; and on advanced and special problems in organization, paragraph development, sentence structure, and usage.

**620 Communication in Organizations** Fall. 3 credits. Prerequisite: permission of instructor.

W 1:25–4:25. S. A. White.

Review of theories, research, and practical systems as they relate to human communication effectiveness in organizations. Includes components of interpersonal communication, intragroup and intergroup communication, communication processes involved in organizational goal setting, renewal and change.

**624 Communication in the Developing Nations**

Fall. 3 credits. Limited to seniors and graduate students.

Hours by arrangement. R. Colle.

An examination of existing communication patterns and systems and their contributions to the development process. Attention is given to the interaction between communication development and national development in primarily agrarian societies.

**631 Studies in Communication** Fall. 3 credits. Limited to graduate students in communication arts; others by permission of instructor.

T R 10:10–11:25. N. E. Awa.

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.

**632 Methods of Communication Research** Fall 3 credits. Limited to graduate students.

M W 10:10–11:25. R. E. Ostman.

An analysis of the methods used in communication research. Emphasis is on understanding the rationale for experimental, descriptive (empirical and nonempirical), and historical-critical research methods.

**640 Seminar in Organizational Communication**

Spring. 3 credits. Open to seniors by permission.

W 1:25–4:25. S. A. White, W. Frank.

Communication functions and systems in business, industry, labor, education, etc., from the perspectives of academic authorities and managers. Development of conceptual schemes for analyzing components of organizational and human communication effectiveness.

**643 Impact of Communication Technologies** Fall 3 credits.

T R 8:30–9:55. J. 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.

**650 Advanced Communication Seminar** Spring. 3 credits. Primarily for graduate students but open to seniors.

M 10:10–12:45. R. D. Colle.

An analysis of communication problems faced by various kinds of public and private sector organizations. Using case studies, the course explores some of the major components of communication strategies, particularly as they relate to communication planning. Examples are drawn from corporate communication programs, nutrition and health nonformal education projects, rural development programs, and government public information campaigns.

**651 Seminar: Communication Issues** Fall and spring. No credit. S-U grades only.

Alternate F 3. Staff.

A departmental seminar that deals with contemporary issues in communication, especially those related to the use of mass media as sources of information and influence, organizational communication, and intercultural communication.

**690–691 Communication Teaching Laboratory** Fall and spring. 1–3 credits each semester. 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.

**760 Advanced Communication Projects** Fall or spring. 3 credits. Limited to communications arts 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.

**895 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

J. P. Bail, chairman; A. L. Berkey, G. J. Broadwell, R. L. Bruce, J. L. Compton, H. R. Cushman, W. E. Drake, D. Drinkwater, J. A. Dunn, J. R. Egner, R. B. Fischer, H. A. Geiselman, J. H. Gould, D. B. Gowin, E. J. Haller, D. E. Hedlund, J. Millman, D. H. Monk, J. D. Novak, G. J. Posner, R. E. Ripple, V. N. Rockcastle, K. A. Strike, H. D. Sutphin, R. W. Tenney, H. L. Wardeberg

**110 Introduction to Psychology** Fall or spring. 4 credits.

Lecs, M W F 10:10; 1 disc sec to be arranged. D. E. Hedlund.

Survey of the major areas of psychological inquiry, with emphasis on the personal application of psychological knowledge to the problems of living and to current social issues, including how to be an intelligent consumer of psychological research.

**240 The Art of Teaching** Spring. 3 credits.

Lec, T 2:30–4; labs to be arranged. G. J. Posner.

This course is designed for all students interested in finding out more about teaching. Teaching is considered an activity in which people of many occupations engage, not limited to schools. Students engage in field experiences to find out what teaching involves (minimum of two hours a week). Class and laboratory work builds on this experience and provides skills and concepts to make the field experience more profitable.

**271 Sociology of Education** Spring. 3 credits. 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.

**311 Educational Psychology** Fall or spring.

3 credits. Prerequisite: introductory psychology. S-U grades optional.

Fall: M W F 11:15; R. E. Ripple. Spring, M W F 9:05; 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. The spring course is designed especially for students in the College of Agriculture and Life Sciences and related units interested in human intellectual growth and development and the management of the teaching-learning process. Special application for students of departments such as communication arts, rural sociology, and extension education, who are concerned with human factor problems of technology transfer or behavioral science research.

**312 Learning to Learn** Spring. 3 credits.

Prerequisite: one or more courses in psychology or educational psychology.

T R 1:25. 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.

**317 Psychology of Adolescence** Spring.

3 credits. Prerequisite: introductory psychology. S-U grades optional.

T R 12:20–1:25. R. E. Ripple.

A survey of the nature of adolescent development, with emphasis on causal factors of adolescent behavior. Focus is on an examination of the interrelationships among the major aspects of adolescent development, an examination of some of the dominant themes of adolescence, acquaintance with research on adolescent development, and implications for the educational process.

**331 Introduction to Teaching Agriculture** Spring. 2 credits. Required of persons who plan to enter the student teaching program.

Lec, M 2–4:25; lab to be arranged. W. E. Drake.

An introduction to the origin and development of curricula, and methods of teaching agriculture in secondary schools. Purposes are (1) to provide exploratory experience as agricultural educators in teaching, extension, and other professions, and (2) to prepare prospective teachers for participation in the resident student-teaching program leading to teacher certification.

**335 Youth Organizations** Spring. 3 credits.

Prerequisite: introductory psychology or permission of instructor.

Lecs, T R 10:10; lab to be arranged. R. W. Tenney.

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 the adult volunteer leader may play. The course is designed to give the student an in-depth,

learning-by-doing experience of how youth organizations function. Field experience with a recognized youth organization is required.

**[340 Theories of Teaching** Fall. 3 credits. Not offered 1983–84.

M W 2:30–3:45. G. J. Posner, K. A. Strike.

This course is intended to assist the student in conceptualizing the process and contexts of teaching in school and nonschool settings. The course examines representative theories of teaching and provides an opportunity for students to develop their own views.]

**352 Reading Statistics** Fall or spring. 1 credit.

Prerequisite for spring: concurrent registration in Education 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.

**353 Introduction to Educational Statistics**

Spring. 3 credits. Prerequisite or corequisite: Education 352 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. Microcomputers and minicomputers are used to explain statistical concepts and to compute statistical indices. A mastery learning-teaching style is employed.

**370 Issues in Educational Policy** Spring. 3 credits.

M W F 10:10. 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.

**378 Economics of Education** Fall. 3 credits. S-U grades optional.

T R 10:10–11:30. D. H. Monk.

An introduction to the use of economic principles to study education and educational policy. Attention is given to the impact of education on male-female and black-white earnings differentials, economic growth, the distribution of earnings, and characteristics of the labor force. The concept of human capital is introduced and developed as a means of understanding these phenomena. Techniques of cost-benefit and cost-effectiveness analysis are used to shed light on current controversies regarding the effectiveness of alternative types of schooling.

**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.

**401 Our Physical Environment** Fall or spring.

3 credits. Prerequisite: permission of instructor. Charge for lab 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. A two-week session on photography and an individual research project are included. Useful for teachers and environmental educators.

**403 Environmental and Natural History Writing**

Spring. 3 credits. Limited to upperclass and graduate students. Prerequisites: a course in composition, working knowledge of biology and ecology, and permission of instructor.

W 7:30–10 p.m. R. B. Fischer.

For those who want to develop skills in changing environmental attitudes and behavior, using newspapers, magazines, and radio. The class produces a weekly environmental awareness column for a local newspaper and writes scripts for a weekly radio program.

**404-405 Field Natural History** Fall or spring 3 credits each semester. Limited to upperclass and graduate students. Prerequisites: basic biology and ecology and permission of instructor. Education 404 is not a prerequisite to 405.

Fall: M 10:10; labs, M R 1:25-4:30. Spring: lec, M 10:10; lab, M 1:25-4:30. R. B. Fischer.

This course provides students who plan to be professional environmental interpreters and educators with methods and materials for sensitizing people to the complexity and fragility of their living environment. It provides practical experiences in teaching about the environment in a variety of classroom and out-of-classroom settings.

**407 Teaching Elementary Science** Fall. 3 credits W 1:25-4:25. V. N. Rockcastle.

An analysis and synthesis of science concepts and related behaviors for children and young adults, with emphasis on sequencing and instruction in schools and environmental centers. Includes an abbreviated weekly practicum in local public school classrooms.

**411 Introduction to Educational Measurement** Fall. 1-3 credits. Prerequisite: one course in statistics if the third module is elected.

T R 9:05-11. J. Millman.  
An overview of educational measurement organized into three, 1-credit independent modules, each one of which can be elected whether or not any of the others are taken. The first module (first third of the term) will treat a myriad of nontechnical testing concerns and practices such as test bias, mislabeling students, test security-cheating, teaching to the test, invasion of privacy, and testing what a person really knows. Hands-on experience selecting and constructing educational measures will be the topic of the second module. During the last third of the term, a module on reliability, validity, and other aspects of test theory will be offered. One course in statistics is a prerequisite only for the third module.

**413 Psychology of Human Interaction** Fall 3 credits. Fee, \$5.

T R 10:10-12:05. D. E. Hedlund.  
Designed to develop skills for, and understanding of, effective interpersonal communication and interaction. The course is largely experiential audio and video recordings in laboratory sessions. Students should have access to a cassette recorder.

**414 Counseling Psychology** Spring 4 credits Limited to 30 students. Prerequisites: introductory psychology, social or personality psychology, and Education 413.

T R 10:10-12:05. D. E. Hedlund.  
The processes of counseling are examined from the perspectives of behavioral psychology and humanistic psychology. Research on adult development, college-age and later, is reviewed, and typical adult counseling issues are examined. Implications are drawn for counseling strategy 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.

**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.

**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. R. W. Tenney.

An opportunity to study individually selected problems in agricultural education.

**432 Teaching Agriculture: Methods, Materials, Practice** Fall. 9 credits. Prerequisite: Education 331 and concurrent registration in Education 430 and 434.

M T W R F 8-3. A. L. Berkey and staff.  
Directed participation in teaching agriculture at the secondary school level. Program includes an intensive, four-week on-campus period where methods and materials of teaching agriculture are treated in detail, combined with a ten-week period in a student teaching center. Includes evaluation of area resources, instructional materials and facilities, development of curricula, directing work experience, planning instruction, and advising youth organizations.

**434 Adult Education Programs in Agriculture** Fall. 3 credits. Prerequisite: concurrent registration in Education 430 and 432.

Lec to be arranged. H. D. Sutphin.  
Determining instructional needs, planning programs of instruction, teaching in groups, giving on-the-job instruction, and evaluating adult education programs in agriculture.

**445 Curriculum Design** Fall. 3 credits. Education 545 may be taken concurrently.

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.

**446 Implementing Instruction** Spring. 2 credits Lec-lab, W 1:25-4:25. V. N. Rockcastle.

A study of the elements of effective instruction in lecture, laboratory, seminar, field trip, and other modes of instruction. Also included are concept and teaching problem analyses as well as practice in developing and presenting various modes of instruction, with critiques by the class.

**447 Instructional Applications of the Microcomputer** Fall, spring, or summer. Variable 1-3 credits.

R 3. H. D. Sutphin.  
An introduction to microcomputer technology and applications for instructional programs, with an emphasis in education. This course will include hands-on activities and such topics as computer terminology, microcomputer equipment selection and operation, and overview of BASIC program language, language alternatives, and selecting and developing educational software programs.

**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.

**473 Contemporary Philosophy of Education** Spring. 3 credits. M W 11:15; disc, 1 hour to be arranged. D. B. Gowin.

The topic is value concepts. Issues of value in education (values clarification, behavior modification, moral development) are treated philosophically by drawing on normative concepts of value (e.g., self-interest, utility, freedom, rights and duties, justice) from ethics and social philosophy. A theory of value for education is discussed.

**477 Law and Educational Policy** Spring 3 credits. Offered alternate years. T 2:30-4:30. K. A. Strike.

A study of recent federal court decisions concerning education. Emphasis on examining legal issues against a background of related educational theory and in terms of the consequences of legal decisions for the development and operation of educational institutions.

**481 Educating for Community Action** Spring 3 credits.

T R 10:10-12:05. R. L. Bruce.  
The design and execution of educational aspects of community-action programs. Deals with the identification and statement of educational goals, selection of teaching strategies, and evaluation of outcomes.

**497 Independent Study** Fall or spring. 1-3 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.  
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.

**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.

Staff.  
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.

**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.

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.

**547 Improvement of College Teaching** Fall, spring, or summer. 2 credits.

Staff.  
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. Videotape techniques will be used to provide a basis for constructive analysis of teaching performance.

**567 Administration of Higher Education** Summer 3 credits. S-U grades optional.

M-R 10-12 and 2-4. Staff.  
This intensive, three-week course focuses on areas of primary importance to those who want an overview of the theory and practice of higher education. Aspects covered in the course include planning, organizing, administering, and evaluating. Also, individualized research papers will be expected.

**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.

Study of topics in education not otherwise provided by a department course. Designed for both current administrators and teachers and those entering the profession.

**603 Teaching Mathematics** Spring. 3 credits.

T R 2:30–3:45. H. A. Geiselmann.

Intended to provide competence in presenting mathematics using various approaches—discovery, audiovisual aids, laboratory techniques, individualized instruction, use of games, puzzles; acquaintance with teaching resources; geometrical constructions; problem solving; discussion of the slow learner. Each student selects a project and presents it to the class.

**606 Seminar in Science and Environmental Education** Fall or spring. 1 credit. S-U grades only.

T 7:30–9:30 p.m. V. N. Rockcastle, R. B. Fischer. Coordinates various interest groups in science and environmental education. Discussions center around curriculum development, research and thesis writing, and current problems.

**611 Educational Psychology** Fall. 3 credits.

Prerequisite: introductory psychology. S-U grades optional.

M W F 1:25. R. E. Ripple.

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.

**612 Introduction to Psychological Testing** Fall. 3 credits.

M W F 11:15–12:20. J. A. Dunn.

This course provides an introduction to the problems and processes of educational and psychological testing in the social sciences. For purposes of this course, testing is defined as the systematic collection of data from individuals or groups of individuals. This course assumes reasonable familiarity with descriptive statistics and such elementary measurement concepts as reliability, validity, response bias, measurement error, and the like. For the students lacking such a background, it is strongly recommended that students take Education 411 or a comparable course concurrently with 612. It is also expected that students will be familiar with basic psychological concepts as taught in general psychology or introductory educational psychology.

**613 A Theory and Methods for Education** Fall. 3 credits. Prerequisite: Education 311 or 511, 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 a project related to their interests. Classes include discussion of student-initiated questions and use of videotape to analyze educational techniques.

**614 Group Processes in Education** Spring

3 credits. Prerequisite: permission of instructor. S-U grades optional.

T R 10:10–12:20. D. E. Hedlund.

Consideration of effective group membership and leadership with emphasis on the theory and practice of facilitating small-group processes. Included are the design and evaluation of structured group exercises for the classroom, the use of groups in counseling, and an examination of the consulting role as an educational strategy.

**616 Affective Education** Spring. 3 credits.

Prerequisite: permission of instructor.

M W 1:25–3:30. D. E. Hedlund.

This course examines the conceptual base and the methodology of teaching for objectives in the

affective realm. The first part of the semester is devoted to the intrapersonal dynamics of individual development and the relationship of affective and cognitive learning. The second part focuses on the interactive nature of the teaching-learning transaction and the effective use of small-group dynamics in teaching. The capability to design teaching-learning experiences that incorporate affective objectives is a major goal. The course is largely experiential, providing participation in a variety of approaches to affective education.

**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.

**630 Special Problems in Agricultural and Occupational Education** Fall or spring; may also

be offered in summer session. 1–3 credits. S-U grades optional.

Hours to be arranged. R. W. Tenney 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.

**632 Teaching Agricultural and Occupational Education** Spring. 3 credits. Prerequisite: an

introductory course in teaching methods or permission of instructor.

M 2:30–5. A. L. Berkey.

The focus of the course is on the selection, use, and evaluation of methods and materials for teaching occupational subjects. Methods for both group and laboratory instruction are covered. Opportunity is provided through use of modules for students to develop teaching competencies based on their individual needs and interests. Development of self-evaluation skills is included. A class project on the selection or development of instructional materials is required.

**633 Curriculum in Agricultural and Occupational Education** Fall. 3 credits.

M 1:25–3:30; labs to be arranged. W. E. Drake.

Current situations affecting occupational education curricula are examined. Principles, objectives, and sources of information are developed for planning curricula. Strategies for developing occupational courses are examined. Consideration is given to planning, developing, and managing work experience programs. Participants have an opportunity to observe ongoing programs at the secondary and two-year-college levels and to pursue individual interests in curriculum improvement.

**643 Structure of Knowledge and Curriculum**

Spring. 3 credits. Prerequisite: permission of instructor.

M W 12:20–2:10. D. B. Gowin.

A method for the critical analysis of knowledge and value claims embedded in primary sources is presented. Students use this method of analysis on materials chosen according to their own background or interest. Students develop their materials to the point where they could be used for instructional purposes. A special theory of curriculum developed by the instructor is presented.

**644 Curriculum Theory and Analysis** Fall.

3 credits. Prerequisite: Education 311 or 511, concurrent registration in Education 511, or permission of instructor.

M W 10:10–11:30. G. J. Posner.

An examination of the basic elements involved in making curriculum decisions, and an analysis of current approaches to curriculum. Students learn to analyze a curriculum in the context of a conceptual framework. This course is the basic graduate course in curriculum.

**650 Methods of Educational Inquiry** Fall

1–3 credits.

T R 2:30–4 (see below for dates). J. Millman.

Techniques of empirical research are offered in three independent units: (a) survey of empirical approaches to social science inquiry, (b) design of educational research, and (c) methods of data collection. Course credit varies, depending upon the number of units the student elects. Units a, b, and c are covered during the first, second, and third thirds of the semester respectively.

**651 Writing a Thesis Proposal** Fall. 1 credit. S-U grades only.

T 4:10–5. 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 on their own.

**654 Evaluation for Program Management** Spring

1–3 credits. S-U grades optional.

M 2:30–5. R. L. Bruce.

The course will consist of three modules, each for one credit:

- 1) Evaluation as a Programming Function. Fitting an evaluation to decision needs; program monitoring, evaluation and information systems. No prerequisite.
- 2) Evaluation Models. Comparative examination of various models and their implications for practice. No prerequisite.
- 3) Practicum in Program Evaluation. Directed practice in the design and conduct of a "live" evaluation. Prerequisite: module 1.

**659 Special Topics in Research Methods** Spring

1–3 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. The course is divided into three independent modules. Students may elect one to three modules in any combination.

**661 Administration of Educational Organizations** Fall. 3 credits.

W 3:35–6. E. J. Haller.

Perspectives on the administration of educational organizations. Consideration of classic and contemporary organization theories and their application to both public 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.

**662 Ethical Issues in Educational Administration** Spring. 3 credits. Offered alternate

years.

T 2:30–4:30. E. J. Haller, K. A. Strike.

This course deals with the identification and conceptualization of ethical problems likely to arise in administering an educational organization. Typical problems concern rights of parents, teachers, and students; equity and due process in hiring; retention and promotion; and race relations. The course integrates case studies with appropriate philosophical literature.

**663 Governance of Public Education** Fall.

3 credits. Offered alternate years.

W 3:35–6. E. J. Haller.

Consideration of the structure of control in public education. Relationships among federal, state, and local agencies and the administrative roles in school districts. Considerable attention is directed to social and political analysis of the community.

**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.

**665 Administrative Decision Making** Spring. 3 credits. S-U grades optional.

W 3:35–6. D. H. Monk.

An introduction to alternative theories of decision making and their relevance to the field of educational administration. Emphasis will be placed on the analysis of the linkages that exist among different levels of decision making within educational systems. Topics will include the impact of state and federal policy on educational organizations, collective bargaining, student decision making, and the dynamics of planned technological change.

**673 Seminar in Dewey's Philosophy of Education** Fall. 3 credits. S-U grades optional.

Prerequisite: work in philosophy and permission of instructor.

R 3–5. D. B. Gowin.

A detailed analysis of some selected major works of Dewey (*Democracy and Education*, *Experience and Education*, *Art as Experience*). One objective of the seminar is to help students learn how to read Dewey and to compare and apply his ideas about education to current problems and issues.

**674 History of American Education** Fall. 3 credits.

M 3:35–5:15. Instructor to be announced.

An examination of American schools, colleges, and other educative agencies from colonial beginnings to the present. An attempt is made to view education in the context of the evolution of American norms and values.

**675 Educational Policy Development and Decision Making** Fall. 3 credits. S-U grades optional.

R 3:35–5:30. E. J. Haller.

This course provides an introduction to the policy-making process in and around the educational institution. After a consideration of the nature of public policy, topics included are governmental responsiveness, power and influence in policy making, political parties and interest groups, and administration as policy making. The class is organized as a seminar. Each student prepares and presents a paper relevant to one of the topics considered.

**678 Planning Educational Systems** Spring. 3 credits. S-U grades optional.

M 2:30–4:30. D. H. Monk.

A seminar focused on a comparative analysis of educational planning as it is practiced in both industrialized and developing nations. Topics will include manpower planning, the social-demand approach to educational planning, benefit-cost analysis, and incentive models of planning. Attention will be given to case studies that will be selected in accordance with students' interests. The political and economic implications of attempts to plan education will be emphasized.

**[679 Policy Issues in Higher Education]** Spring. 3 credits. S-U grades optional. Not offered 1983–84.

M 2:30–4:30. D. H. Monk.

A seminar dealing with the planning, financing, and administration of higher educational organizations. Topics include a critical assessment of current

approaches to macrolevel planning as well as the analysis of special problems associated with the financing and administration of particular types of colleges and universities.]

**681 Designing Extension and Continuing Education Programs** Fall. 3 credits. Prerequisite: permission of instructor.

T 1:25–4. R. L. Bruce.

Designed to help students understand current theories, concepts, principles, and procedures relevant to the process of 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.

**[682 Community Education Development]** Fall. 3 credits.

W 2:30–5. J. L. Compton. Not offered 1983–84; first offered 1984–85.

For students who have interest or experience in education or development programs where community is an important concern. 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, paraprofessionals, volunteers, leadership development, council formation and function, interagency coordination, and change-agent roles.]

**683 Administration of Nonformal Education**

Spring. 3 credits. Prerequisite: prior work experience preferred.

W 1:20–4. G. J. Broadwell.

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, management by objectives, and decision-making strategies. Particular attention is given to leadership of organizations with volunteer staff.

**684 Adult Education Programs: Organization and Direction** Fall. 3 credits.

F 1:25–4:20. H. D. Sutphin.

Alternative procedural models for organizing and conducting adult occupational education courses are presented. Guidelines and procedures for implementing the models in secondary and postsecondary school settings are emphasized.

**690 Research Seminar** Fall or spring. No credit.

M 4–5:30. J. P. Bail.

Presentation of current research in the field of education by graduate students and staff. Opportunities to discuss methodology, findings, and other aspects of research.

**711 Contemporary Issues in Educational Psychology** Spring. 3 credits. S-U grades optional.

M W F 11:15–12:20. J. A. Dunn.

This is a graduate-level seminar divided into two parts. Part I: the changing role of formal education in American society and projections of educational practice in the future; implications for psychologists; the computer revolution and its implication for learning and teaching; educational psychology for developing countries-peoples: Is U.S. psychology good enough? Part II: the impact of research on educational practice; principles of instructional system design; individualized instruction; contributions of learning theory to human instruction; education in our aging society; factors influencing human performance; curricula change for the 1990s. Treatment of topics in part II will be based on a

learning-teaching team approach. Each person will prepare and give at least one lecture. Designated teams (self-selected) will prepare collective notes.

**[712 Seminar in Educational Psychology and Curriculum]** Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. Not offered 1983–84.

Hours to be arranged. R. E. Ripple.

Selected aspects of the relationship between curriculum and the psychology of education. Emphasis is on the psychology of human learning and implications for structuring learning experiences and curriculum development. Appropriate for graduate students in educational psychology, curriculum, and instruction and for others with interests in the relationship between psychology and curriculum.]

**715 Seminar in Counseling Psychology** Fall or spring. Variable credits. S-U grades only.

W 1:25–3:30. D. E. Hedlund.

Selected topics in counseling psychology to be announced.

**718 Adult Learning and Development** Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. Offered alternate years.

Hours to be arranged. R. E. Ripple, R. L. Bruce.

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.

**730 Seminar in Agricultural and Occupational Education** Spring. 1–3 credits. S-U grades optional.

R 2:30–4:25. H. D. Sutphin.

For master's degree candidates who have had teaching experience and doctoral candidates with majors or minors in agricultural and occupational education. Emphasis is on current problems and research and includes discussion of student research proposals.

**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.

**736 Occupational Education Program: Administration and Supervision** Spring. 3 credits. Offered alternate years.

T 3:35–6; special sessions to be arranged.

J. P. Bail.

Practices and procedures of organizing, administering, and supervising programs of occupational education at the secondary and postsecondary level are stressed. The role of the director in providing leadership in improving instruction, designing programs, and using resources at federal, state, and local levels is considered.

**739 Evaluating Programs in Occupational Education** Spring. 3 credits.

T 1:25–3:20; labs to be arranged. W. E. Drake.

This course examines objectives, criteria, and strategies for evaluating programs of occupational education in secondary and postsecondary schools. 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 evaluative instruments. Field trips and resource persons provide opportunities to observe actual evaluation problems and procedures.



**745 Seminar in Curriculum Theory and Research**

Spring. 3 credits. Prerequisite: Education 445–545 or permission of instructor.

W 9:05–11:30. G. J. Posner.

Theoretical issues in curriculum, and appropriate areas for curriculum research are discussed.

**750 Conceptual Problems in Educational Inquiry**

Fall. 3 credits. Prerequisite: experience or course work in research. S-U grades optional.

R 12:20–2:20. D. B. Gowin.

Techniques and procedures for the critical appraisal of research documents. Practice in such appraisal is required, with primary emphasis on conceptual structures rather than research techniques. Students may use their own research proposals or research products as material for analysis.

**752 Organization and Management of Sponsored Research**

Fall. 3 credits. S-U grades only.

M W F 9:05–10:10. J. A. Dunn.

Designed for doctoral students, advanced graduate students, and practicing researchers who have or expect to have responsibility for the promotion, management, or supervision of sponsored research, development, or evaluation projects. The seminar is devoted to an in-depth review of the history of sponsored research, patterns of federal support, the federal procurement process, proposal preparation, research management, and futures analysis. Successful and unsuccessful proposals will be analyzed. Attention is given to alternative strategies for sponsored proposal development. (This is not a thesis proposal seminar.)

**762 Research in Educational Administration**

Spring. 3 credits. Prerequisite: one course in elementary statistics or permission of instructor. S-U grades only.

Hours to be arranged. E. J. Haller.

An analysis and critique of current research in educational administration. Discussion of research priorities and strategies in the conceptual area of educational governance. For graduate students interested in conduct of research on problems of educational governance. Students will carry out a small-scale empirical research project.

**771 Seminar in the Sociology of Education**

Fall. 3 credits. S-U grades optional.

Hours to be arranged. E. J. Haller.

Intensive study of a selected topic in the sociology of education, with consideration of its organizational and policy implications.

**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

**782 Behavioral Change in International Rural Modernization**

Fall. 3 credits.

J. L. Compton.

For students who have interest or experience in international rural development or community development. An exploration of the social psychological aspects of socioeconomic development, focusing on the theoretical orientations of individual modernity, values-beliefs-motives, achievement motivation, entrepreneurship, innovativeness, expectancies, and self-efficacy, and the applied orientations of indigenous learning and knowledge systems, adoption behavior under conditions of risk and uncertainty, appropriate social-educational-biochemical technology, communication-diffusion of innovations, and development education.

**783 Comparative Extension Education Systems**

Spring. 3 credits. Prerequisite: Education 627 or permission of instructor.

R 1:25–4:25. J. L. Compton.

Extension education in the developing nations is studied using, as an analytical frame of reference, a hypothetical model comprised of such components

as community organization, community-based learning, indigenous facilitators and leaders, extension generalists and specialists, residential training, and research-training linkages. Case materials on alternative extension models and intercounty experiences provided an empirical base.

**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.

**900 Doctoral-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.

Limited to students working on theses or other research and development projects.

**Related Course in Another Department****Historical Roots of Modern Psychology (Psychology 490)**

## Entomology

M. J. Tauber, chairman; W. L. Brown, Jr., R. I. Carruthers, E. W. Cupp, J. E. Dewey, G. C. Eickwort, P. P. Feeny, G. G. Gyrisco, H. H. Hagedorn, W. T. Johnson, J. P. Kramer, J. K. Liebherr, R. A. Morse, A. A. Muka, B. L. Peckarsky, D. Pimentel, E. M. Raffensperger, R. B. Root, D. A. Rutz, A. J. Sawyer, M. Semel, D. M. Soderlund, W. M. Tingey, Q. D. Wheeler, C. F. Wilkinson, R. G. Young

Emeritus professors: C. O. Berg, J. G. Franclemont, C. E. Palm, R. L. Patton, L. L. Pechuman, W. A. Rawlins, E. H. Smith

### Courses by Subject

Apiculture: 260, 262, 264  
Behavior: 662  
Ecology: 370, 455, 457, 471, 664, 672  
Introductory courses: 200, 212  
Medical entomology and pathology: 452, 453, 454  
Morphology: 322  
Pest management: 241, 342, 443, 444, 640, 677  
Physiology and toxicology: 483, 685, 690  
Systematics and acarology: 331, 332, 621, 631, 633, 634, 636, 674

**200 Insects and Man**

Fall. 2 credits. S-U grades optional. Intended for students in all colleges.

Lecs, T R 11:15. 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.

**212 Insect Biology**

Fall. 3 credits. Prerequisite: Biological Sciences 101–102 (may be taken concurrently) or equivalent.

Lecs, W F 11:15; lab, M T W or R 2–4:25.

G. C. Eickwort.

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 stressing ecological categories is required.

**241 Applied Entomology**

Spring. 3 credits. Prerequisite: Biological Sciences 101–102 or equivalent.

Lecs, T R 10:10; lab, M T W R or F 2–4:25.

E. M. Raffensperger.

A compendium of the insects associated with crops and farm animals. Discussions of insect pest management requirements on farm and in garden, along with descriptions of control methods, materials, and equipment.

**260 Introductory Beekeeping**

Fall. 2 credits.

Lecs, T R 11:15. R. A. Morse.

Introduces the fundamentals of practical beekeeping, including the life history, instincts, and general 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.

**262 The Biology of the Honey Bee**

Fall. 1 credit. Limited to 10 students. Prerequisite: permission of instructor.

Labs, afternoons or weekends to be arranged; course will meet in September and October only.

R. A. Morse.

A series of laboratories in which students perform some of the classical experiments on honey bee behavior. Various techniques used in bee research are introduced.

**264 Practical Beekeeping**

Fall. 1 credit. Limited to 20 students. Prerequisite: Entomology 260 (may be taken concurrently).

Lab, W or 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 laboratories cover management of bees for apple pollination, honey harvesting and processing, and disease identification and control.

**322 Insect Morphology**

Fall. 5 credits. Prerequisite: Entomology 212 or 241. Offered alternate years.

Lecs, M W F 10:10; labs, M F or T R 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.

**331 Introductory Insect Systematics**

Spring. 4 credits. Prerequisite: Entomology 212.

Recommended: concurrent enrollment in Entomology 332.

Lecs, T R 10:10; labs, T R 1:25–4:25;

W. L. Brown, Jr.

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.

**332 Systematics Discussion Group**

Spring. 1 credit. Prerequisite: concurrent enrollment in Entomology 331 or permission of instructor. S-U grades only.

Disc, hours to be arranged. Q. D. Wheeler.

Readings and discussion on topics in systematics coordinated with the lecture series in Entomology 331.

**341 Arthropods of World Importance**

Fall. 2 credits. Prerequisite: Entomology 212 or 241 or permission of instructor.

Lecs, T R 9:05. E. H. Smith.

The impact of arthropods on human affairs is considered. Special attention is given to problems of insect control in developing countries and the influence of cultural, social, and economic factors on the options for control available to them.

**342 Special Topics in Economic Entomology**

Hours to be arranged. Staff.

Topics to be announced.

**370 Pesticides in the Environment (also Toxicology 370)** Fall. 2 credits. Prerequisites: Biological Sciences 101–102 or equivalent. Lecs, T R 9:05. D. M. Soderlund.

A survey of the different types of pesticides, their uses, their distribution in the environment, and their effects on various components of the environment. For students whose main emphasis is not in pesticide usage.

**441 Seminar in Insect Pest Management** Spring. 1 credit. Limited to 10 students. Prerequisite: Entomology 241 or 444 or permission of instructor. S-U grades only.

Hours to be arranged. A. M. Shelton, A. J. Sawyer. Discussion of topics in pest management, with an emphasis on insect pest management. Group discussion will focus on critical readings of the literature. Topics include the philosophy and foundations of pest management and an examination of its principal tools.

**443 Pathology and Entomology of Trees and Shrubs (also Plant Pathology 443)** Fall. 5 credits. Prerequisites: either Plant Pathology 301 and Entomology 241 or equivalent.

Lecs, M W F 10:10; labs, T R 1:25–4:25 or W F 1:25–4:25. Evening prelims. W. T. Johnson, G. W. Hudler.

For description see Plant Pathology 443.

**444 Integrated Pest Management (also Plant Pathology 444)** Fall. 4 credits. Prerequisites: Biological Sciences 260 or 360, Entomology 212 or 241, and Plant Pathology 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, A. J. Sawyer.

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.

**452 Medical Entomology** Fall. 3 credits. Prerequisites: either Entomology 212 and Veterinary Medicine 330 or permission of instructor. Offered alternate years.

Lecs, T R 10:10; lab, R 1:25–4:25. E. W. Cupp. A survey of arthropods of public health and veterinary importance, with emphasis on transmission dynamics of pathogens, bionomics of vector populations, and current control concepts. Morphology and taxonomy of selected groups are examined in the laboratory, with additional exercises in vector-pathogen relationships and epidemiological techniques.

**[453 Insect Pathology]** Spring. 4 credits. Prerequisites: Entomology 212 or 241 or permission of instructor. Recommended: a course in microbiology. Offered alternate years. Not offered 1983–84.

Lecs, M W 10:10; lab, R 1:25–4:25. J. P. Kramer. 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.]

**454 Insect Pathology Seminar** Spring. 1 credit. Prerequisites: Entomology 453. S-U grades only. Offered alternate years.

Hours to be arranged. J. P. Kramer. Presentations, discussions, and analyses of current topics by the participants. Focus centers on microbial diseases of insects.

**455 Insect Ecology, Lectures (also Biological Sciences 455)** Fall. 2 credits. Prerequisites: Biological Sciences 360 and Entomology 212, or their equivalents. Recommended: concurrent enrollment in

Biological Sciences 457. Offered alternate years. Lecs, W F 11:15. 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.

**457 Insect Ecology, Laboratory (also Biological Sciences 457)** Fall. 2 credits. Limited to 16 students. Prerequisite: concurrent enrollment in Biological Sciences 455. Offered alternate years.

Lab, W 1:25–4:25; F or S field trips to be arranged during the field season. R. B. Root. Field exercises focus on insect natural history and methods of sampling populations. Laboratories devoted to rearing insects, estimating life-table parameters, and analyzing communities.

**471 Ecology and Systematics of Freshwater Invertebrates** Spring. 4 credits. Prerequisite: Entomology 212. Recommended: Biological Sciences 360–462–464.

Lecs, T R 9:05; labs, T R 1:25–4:25, with overflow section M W 1:25–4:25 (see instructor). One evening prelim. B. L. Peckarsky.

The lecture explores the life histories, behavior, feeding ecology, and limitations to distributions of macroscopic freshwater invertebrates with an emphasis on insects. The laboratory involves field collections and laboratory identification of invertebrates, and stresses the use of keys. Students may elect to conduct ecological field projects or to study the systematics of freshwater invertebrates in more depth.

**483 Insect Physiology** Spring. 4 credits. Prerequisite: Entomology 212.

Lecs, M W F 11:15; lab, W or F 1:25. H. H. Hagedorn.

An introduction to the often unique ways that 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.

**497 Special Topics for Undergraduates** Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work. Staff.

**499 Undergraduate Research** Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work. Staff.

**621 Acarology** Fall. 4 credits. Prerequisites: Entomology 212 and permission of instructor. Offered alternate years.

Lecs, M F 10:10; labs, M F 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.

**631 Systematics of the Coleoptera** Fall. 4 credits. Prerequisite: Entomology 331. Offered alternate years.

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.

**[633 Systematics of the Diptera and Hymenoptera]** Spring. 3 credits. Prerequisite: Entomology 331. Offered alternate years. Not offered 1983–84.

Lecs, W 10:10; labs, W F 1:25–4:25. W. L. Brown. 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.]

**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.

**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.

**[640 Pest Management: Quantitative Aspects]** Fall. 3 credits. Prerequisites: Entomology 444 and a course in calculus. Recommended: an introductory course in computer science. S-U grades optional. Offered alternate years. Not offered 1983–84.

Lecs and disc, T R 10:10–12:15. A. J. Sawyer. Quantitative aspects of the development of pest and agricultural resource management systems. Systems analysis, modeling and simulation, sampling, quantitative biological research, and economics are covered in lectures. Discussions of philosophical issues and current and classical literature.]

**662 Insect Behavior Seminar** Spring. 2 credits. Prerequisites: permission of instructors and either Entomology 212 and Biological Sciences 321 or equivalents. S-U grades optional. Offered alternate years.

Hours to be arranged. G. C. Eickwort, M. J. Tauber.

**[664 Seminar in Coevolution between Insects and Plants]** 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. Not offered 1983–84.

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.]

**[672 Seminar in Aquatic Ecology]** Spring. 1 credit. Prerequisites: permission of instructor and either Entomology 471 or Biological Sciences 462, 464. Offered alternate years. Not offered 1983–84.

Hours to be arranged. B. L. Peckarsky. Discussion and analysis of current topics in the ecology of streams and lakes, including synthesis of key papers in the literature. Reports on personal research or ideas by students are encouraged.]

**674 Principles of Systematics (also Biological Sciences 674)** Spring. 4 credits. Prerequisite: Entomology 331 or introductory systematics course in another field of biological sciences.

Lecs, M W 1:25; labs, M W 2–4:25; disc, hours to be arranged. Staff (Q. D. Wheeler, coordinator). An introduction to modern theory and methods of systematic biology. Lectures on theoretical systematics, including species concepts, classification, phylogenetics, and biogeography. Laboratories include modern methods of finding characters (such as comparative morphology, karyology, electrophoresis, ontogenetic sequencing)

and various methods of analysis of data (e.g., cladistic hand and computer methods, numerical methods). Part of laboratory grade is based on a final paper.

**[677 Biological Control]** Fall. 3 credits. Prerequisites: Entomology 212, Biological Sciences 360, and permission of instructor. Offered alternate years. Not offered 1983-84.  
Lecs, T R 9:05; lab, T 2-4:25. M. J. Tauber.  
Theory and method of biological control of arthropod pests and weeds. Laboratory includes studies with living parasites and predators.]

**685 Seminar in Insect Physiology** Spring 1 credit. Prerequisite: permission of instructor. Hours to be arranged. H. H. Hagedorn.

**690 Insect Toxicology and Insecticidal Chemistry (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. C. F. Wilkinson.  
The chemistry of insecticides and their metabolism and mode of action in insects and mammals.

**707 Special Topics for Graduate Students** Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Not for thesis research. Staff.

**708 Graduate Research** Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Not for thesis research. Staff.

**709 Teaching Entomology** Credit to be arranged. Staff.  
Teaching entomology or for extension training.

**800 Master's-Level Thesis Research** Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional. Staff.

**900 Doctoral-Level Thesis Research** Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional. Staff.

**Jugatae Seminar** Fall and spring. M 4-5.  
A seminar conducted by Jugatae, the entomology club of Cornell University, to discuss topics of interest to its members and guests.

## Floriculture and Ornamental Horticulture

C. F. Gortzig, chairman; M. I. Adleman, N. L. Bassuk, A. M. Elliot, C. C. Fischer, R. T. Fox, G. L. Good, T. H. Johnson, R. J. Lambert, R. W. Langhans, A. S. Lieberman, L. J. Mirin, R. G. Mower, K. W. Mudge, F. B. Negm, A. M. Petrovic, E. F. Schaufler, J. G. Seeley, R. T. Trancik, P. J. Trowbridge

### Courses by Subject

Commercial floriculture crop production: 424, 425  
Freehand drawing and illustration: see page 00  
Horticultural physiology: 401, 402, 601  
Introductory courses: 100, 105  
Landscape architecture (professionally accredited program): see pages 00 and 00.  
Landscape horticulture: Landscape Architecture 205, 220, 224, 240, 310, 311, 521, 522  
Nursery management: 421  
Plant materials: 213, 312, 313, 322, 342, 450  
Retail floriculture: 105, 325  
Turfgrass management: 314, 318

**100 Floriculture and Ornamental Horticulture: An Introduction** Fall. 3 credits. Principally for freshmen. S-U grades optional for students not specializing in floriculture and ornamental horticulture. Estimated cost of field trip, \$5-10.

Lecs, M W 8; lab, T or W 2-4:25. Faculty.  
An introduction to basic plant physiology and plant processes, control of the plant environment, and the floriculture and ornamental horticulture industry and opportunities. A required one-day field trip is made to nearby commercial enterprises.

**105 Floral Design** Fall or spring. 2 credits. Each laboratory limited to 22 students. Prerequisite: permission of instructor; preference given to plant science majors, then to students in education, design, and journalism. \$50 charge to purchase instructional plant materials that the student will keep. Enrolled students who do not attend the first class and fail to notify the secretary in Plant Science Room 20 of their absence will automatically be dropped from the course.

Lec-lab, T or R 1:25-4:25. C. C. Fischer.  
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 plant materials, emphasizing the economical use of all supplies.

**213 Woody Plant Materials** Spring 4 credits \$20 fee for lecture/laboratory manual.

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, and vines used in landscape plantings. Emphasis is on winter identification and their values for use as landscape material.

**312 Garden and Interior Plants I** Fall. 3 credits. \$20 fee for lecture/laboratory manual.

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 other interior landscape situations. Emphasis is on identification, use, and general cultural requirements.

**313 Woody Plant Materials for Landscape Use** Fall. 3 credits. Limited to 30 students. Primarily for landscape architecture majors. \$20 fee for lecture/laboratory manual.

Lec, M W 9:05; lab, W 10:10-12:05. 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 their usefulness as landscape subjects. Opportunity for independent study is provided.

**314 Turfgrass Management** Fall. 3 credits. Prerequisites: Agronomy 200. Recommended: Biological Sciences 242 or permission of instructor. Cost of supplies, \$10; One M field trip required: cost, \$5.

Lecs, M F 11:15; lab, F 12:20-2:15. A. M. Petrovic.  
The scientific principles, practices, and materials for the construction and maintenance of lawn, sports, and utility turfgrass areas. Environmental effects on growth are also studied.

**318 Advanced Turfgrass Management** Fall. 2 credits. Prerequisites: Floriculture 314 or equivalent, and permission of instructor. Cost of field trips, \$10.

Hours to be arranged. A. M. Petrovic.  
A continuation of Floriculture 314, with emphasis on applying scientific principles to management of golf courses, athletic fields, parks, industrial grounds, and sod production.

**322 Garden and Interior Plants II** Spring 3 credits. Prerequisite: Floriculture 312 or permission of instructor. \$20 fee for lecture/laboratory manual.  
Lecs, M W 11:15; lab, M 2-4:25 (two sections to be arranged). R. G. Mower.

A continuation of Floriculture 312. 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, crocus, iris, as well as other spring-blooming bulbs and perennial plants. Outdoor laboratories emphasize practical gardening activities appropriate to the spring season.

**325 Flower-Store Management** Fall. 3 credits. Prerequisites: Floriculture 105 and permission of instructor. Lab materials charge, \$50. Cost for field trips, \$20 plus room and meals.

Lecs, W F 11:15-12:20; lab, F 1:25-4:25. R. T. Fox.  
Lectures devoted to flower-shop management, business methods, merchandising, and marketing of floricultural commodities. Laboratories include the application of subject matter and the principles of commercial floral arrangement and design. Required field trips made to flower shows and to wholesale and retail florist establishments.

**342 Taxonomy of Cultivated Plants (also Biological Sciences 342)** Spring. 4 credits

Lecs, M W 10:10; labs, M W 2-4:25.  
J. W. Ingram, Jr.

A study of ferns and seed plants, their relationships, and their classification into families and genera, emphasizing cultivated plants. Emphasis is on gaining proficiency in identifying distinguishing families and to preparing and using analytical keys; attention is also given to the economic importance of taxa, to the basic taxonomic literature, and to the elements of nomenclature.

**401 Principles of Plant Propagation** Fall. 3 credits. Prerequisite: Biological Sciences 242 or other course in plant physiology. Field trip fee, \$10.  
Lecs, T R 8; lab, R 1:25-4:25 (except field trips lasting until 6:30 p.m.). Evening prelims.  
K. W. Mudge.

Propagation of plants from seed and by vegetative techniques including cuttings, tissue culture, grafting, layering, etc. Physiological, environmental, and anatomical principles are stressed rather than hands-on techniques. Examples include horticultural, agronomic, and forestry crops.

**402 Physiology of Horticultural Plants** Spring. 4 credits. Prerequisite: Biological Sciences 242 or 341 or permission of instructor.

Lec, M W F 8; lab to be arranged. F. B. Negm.  
A study of the physiology of growth and development of horticultural plants in response to their environment.

**421 Principles of Nursery-Crop Production** Fall. 4 credits. Prerequisite: Floriculture 401. Fee to cover supply costs associated with the course, \$15.

Lecs, M W F 9:05; lab, M 12:20-2:15, 2:30-4:25; field trips are included. G. L. Good.  
Problems of commercial propagation and growth of nursery plants to marketable stage, including the postharvest handling of nursery stock. Some consideration is given to the planting and culture of landscape plants.

**424 Principles of Florist-Crop Production** Spring. 4 credits. Limited to 40 students. Preference given to juniors. Prerequisites: Floriculture 401 and Biological Sciences 242, 342 (may be taken concurrently), or equivalent, or permission of instructor. Cost for field trip and special laboratory supplies, \$25.

Lec, M W F 9:05; lab, R 2-4:25. J. G. Seeley.  
Commercial production of florist crops. Emphasis on principles of culture of ornamental plants as influenced by greenhouse environment. Three field trips are made to commercial greenhouses.

**425 Greenhouse Production Management**

Spring. 4 credits. Primarily for seniors. Prerequisite: an elementary course in horticulture or equivalent. Cost for field trips, \$150.

Lecs, T R 10:10–12:05. Two field trips.

R. W. Langhans.

Introduced 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.

**450 Special Topics on Ornamental Plants**

Fall or spring. Credit to be arranged. Primarily for upperclass floriculture and ornamental horticulture majors. Prerequisites: Floriculture 213, 312, 313, 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.

**497 Special Topics in Floriculture and Ornamental Horticulture**

Fall or spring. 1 or more credits. S-U grades optional. Prerequisite: students must satisfy the staff member under whom the work is to be taken that their background warrants their choice of problems. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work and assign the grade.

C. F. Gortzig and faculty.

Study of topics under investigation by the department or of special interest to the student.

**600 Seminar**

Fall or spring. For department faculty and graduate students. S-U grades only.

R 12:10. C. F. Gortzig and faculty.

**601 Current Topics in Floricultural and Ornamental Horticultural Physiology**

Spring. Variable credit. Prerequisite: permission of instructor.

Hours to be arranged. F. B. Negm.

Discussions of modern concepts, research, and commercial problems as reflected in current horticultural literature.

**Freehand Drawing and Illustration****109 Nature Drawing**

Fall. 3 credits. Limited to 25 students. S-U grades optional.

M W F 10–12. 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, etc. Outside field notebook assignments.

**111 Freehand Drawing**

Fall or spring. 3 credits. Each section limited to 25 students. S-U grades optional. Credit may not be received for both Floriculture 109 and 111.

Fall: lec, R 10:10; studio, T 9:05–11, R 1:25–4.

Spring: permission of instructor required (lec and all studio hours must be scheduled). Lec T or W 10:10, plus 5 additional studio hours to be scheduled in 2- or 3-hour blocks during M T W R F 9:05–12:20 and T 1:25–4. A. Elliot.

Developing accuracy of observation and a personal graphic vocabulary. Freehand perspective and its uses in establishing design and spatial relationships, practice in figure and landscape drawing, form vs. value drawing. Outside sketchbook assignments.

**210 Architectural Sketching in Watercolor**

Summer. 3 credits.

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.

**211 Freehand Drawing and Illustration**

Fall. 2 credits. Prerequisite: Floriculture 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.

**214 Watercolor**

Spring. 2 credits. Prerequisite: Floriculture 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.

**316 Advanced Drawing**

Fall or spring. 2 credits. Prerequisite: Floriculture 211 or permission of instructor. S-U grades optional.

6 hours to be arranged. A. Elliot or R. J. Lambert.

For students who want to attain proficiency in a particular type of illustration or technique.

**417 Scientific Illustration**

Fall. 2 credits. Prerequisite: Floriculture 211 or 316 or equivalent.

S-U grades optional for graduate students only.

6 studio hours scheduled between 9:05 and 12:05

M W F. A. Elliot.

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.

**Landscape Architecture****201 Studio: Design Fundamentals**

Fall. 6 credits. Limited to landscape architecture majors. Lab fee, \$20; 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.

Required 5-day field trip. T. H. Johnson, L. J. Mirin.

An introduction to landscape architectural design approaches, design process, problem-solving, and design skills.

**202 Studio: Site Planning**

Spring. 6 credits. Prerequisite: Landscape Architecture 201 with a grade of C or better. Lab fee, \$20; cost of drafting supplies, about \$100.

Lecs, M W F 1:25; studios M W F 2:30–4:25.

M. I. Adleman, R. T. Trancik, P. J. Trowbridge.

Project planning focusing on the organization of outdoor space, the siting of structures, and the interrelationships of pedestrian circulation, parking, open spaces, earth form, and vegetation.

**205 Graphic Communication I**

Fall. 3 credits. Prerequisite: concurrent enrollment in Landscape Architecture 201 or Landscape Architecture 501 or permission of instructor. Cost of supplies, about \$30.

Lecs, T R 9:05–11. P. J. Trowbridge.

Principles of graphic presentation, including the use of media and rendering techniques applicable to presentation drawings for landscape architecture projects. Plan graphics, orthographic projections, isometric drawing, one- and two-point perspective as well as sections, elevations, and lettering.

**206 Graphic Communication II**

Spring. 3 credits. Prerequisite: Landscape Architecture 205.

Lecs, T R 9:05–11. R. T. Trancik.

A drawing-skills course that relates graphic communication techniques to applications and

presentation of space and form. The course will introduce students to advanced graphic expression and delineation, visual ordering systems, and modes of conceptual representation of pattern and volume.

**220 Principles of Spatial Design**

Fall. 3 credits.

Lecs, M W 9:05; disc F 9:05. R. T. Trancik. Basic principles involved in analysis, design methods, and theories as they relate to shaping the outdoor spatial environment. Readings and case studies deal with the application of these principles to all scales of landscape planning, urban design, and the history of the built environment as a source for the contemporary practice of landscape architecture.

**224 Plants and Design**

Spring. 3 credits. Basic

field trip expenses, about \$20.

Lecs, M W F 10:10. Required field trips.

M. I. Adleman.

Planting design principles; functional uses of plants in the landscape; ecological, horticultural, and maintenance determinants affecting the selection and use of plant materials; plans, specifications, and procedures involved in planting implementation.

**301–302 Studio: Regional Landscape Planning**

Fall. 301, weeks 1–7, 3 credits; 302, weeks 8–14,

3 credits. One or both courses may be taken.

Prerequisite: Landscape Architecture 202 with grade of C or better. Lab fee, \$10 per seven week course; cost of drafting supplies, about \$50 per course; expenses for field trip in 301, about \$200.

Lecs, M W F 1:25; studios, M W F 2:30–4:25.

Required 5-day field trip in 301. P. J. Trowbridge. Application of regional landscape planning methods and techniques; management and planning within watersheds, other physiographic units, and politically defined landscapes.

**303–304 Studio: Urban Design**

Fall. 303, weeks

1–7, 3 credits; 304, weeks 8–14, 3 credits. One or

both courses may be taken. Prerequisite: Landscape Architecture 202 with grade of C or better. Lab fee, \$10 per seven-week course; cost of drafting supplies, about \$50 per course; expenses for field trip in 303, about \$200.

Lecs, M W F 1:25; studios, M W F 2:30–4:25.

Required 5-day field trip in 303. R. T. Trancik.

Application of town-planning and urban-design techniques to specific field problems. Timely urban issues are investigated, including physical design considerations as well as the complex socioeconomic implications of urban design. Site-development problems at several scales and land-use intensities are examined.

**306 Studio: Interdisciplinary Site Planning**

Spring. 6 credits. Prerequisite: Landscape Architecture 301, 302, 303 or 304 with a grade of C or better. Lab fee, \$20; cost of drafting supplies, about \$100.

Lecs, M W F 1:25; studios, M W F 2:30–4:25.

T. H. Johnson.

Emphasis in this studio includes methods of conceptualizing design and the application of design principles to multidisciplinary professional projects.

**310 Site Construction I**

Spring. 4 credits.

Prerequisite: permission of instructor.

Lecs, M W 9:05; studio, T R 9:05–11.

P. J. Trowbridge.

Lectures, exercises, and projects dealing with land-form design and the preparation of grading plans, calculation of earthwork, and layout of circulation systems, parking, and site utility systems. Required technical material is presented in modules with interim testing for competency in the subject areas.

**311 Site Construction II**

Fall. 4 credits.

Prerequisite: permission of instructor. Lab fee, \$60.

Lecs, T R 1:25; studios, T R 2:30–4:25.

T. H. Johnson, M. I. Adleman.

Construction materials and methods used by landscape architects in project implementation.

Course includes student involvement in demonstration construction, lectures, field trips, studio work on details and models, and construction documentation for a selected design project.

**340 Landscape Design** Fall. 4 credits. Limited to 15 students; priority given to landscape horticulture majors. Prerequisite: permission of instructor. Lab fee, \$20.

Lecs, T R 1:25; studios, T R 2:30–4:25.

M. I. Adleman, T. H. Johnson.

Fundamentals of landscape design applied to residential and other small-scale site-planning projects. Work in the studio introduces design process, site-design principles, construction materials, planting design, and graphics.

**401 Studio: Professional Practice** Fall, weeks 1–7. 3 credits. Prerequisite: Landscape Architecture 306 with a grade of C or better. Lab fee, \$10; cost of supplies, about \$50; basic expenses for field trip, about \$200.

Lecs, M W F 1:25; studios, M W F 2:30–4:25.

Required 5-day field trip. M. I. Adleman.

Comprehensive professional procedures involved in the design process, including client contact, project definition, design synthesis, design development, contract documentation, construction administration, and continuing landscape management.

**403 Studio: Advanced Site Design** Fall, weeks 8–14. 3 credits. Prerequisite: Landscape Architecture 306 with a grade of C or better. Lab fee, \$10; cost of supplies, about \$50.

Lecs, M W F 1:25; studios, M W F 2:30–4:25.

M. I. Adleman.

Site design and construction with a particular focus on the principles and process of site grading and the further development of site grading skills.

**405 Senior Project Seminar** Fall. 1 credit.

Prerequisite: concurrent registration in Landscape Architecture 401–403.

W 12:20. P. J. Trowbridge.

Seminar and preparation of program and base material for senior projects in landscape architecture. Each student is required to select a project, develop a program, collect necessary data and base material, and make a presentation to the class for discussion. Landscape architecture majors must develop an approved project manual as a prerequisite for Landscape Architecture 403.

**406 Studio: Senior Project** Spring. 6 credits.

Prerequisite: Landscape Architecture 405 and 401–403 with a grade of C or better. Lab fee, \$20; cost of supplies and reproductions, about \$200.

Lecs, M W F 1:25; studios, M W F 2:30–4:25.

R. T. Trancik, P. J. Trowbridge.

Inventory, analysis, and design methods applied to approved project program developed in Landscape Architecture 405. The senior project represents an evaluation of minimum competency in landscape architecture.

**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.

**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.

**500 Graduate Orientation Seminar** Fall. 1 credit.

S-U grades only.

Staff.

Presentation and discussion of work of Cornell faculty in and related to the field of landscape architecture.

**501 Studio: Design Fundamentals** Fall. 6 credits.

Prerequisite: permission of instructor. Lab fee, \$20; 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.

Required 5-day field trip. T. H. Johnson, L. J. Mirin.

An introduction to landscape architectural design approaches, design process, problem solving, and design skills.

**502 Studio: Site Planning** Spring. 6 credits.

Prerequisite: permission of instructor. Lab fee, \$20; cost of drafting supplies, about \$100.

Lecs, M W F 1:25; studios, M W F 2:30–4:25.

M. I. Adleman, R. T. Trancik, P. J. Trowbridge.

Project planning focusing on the organization of outdoor space, the siting of structures, and the interrelationships of pedestrian circulation, parking, open spaces, earth form, and vegetation.

**\*520 Contemporary Issues in Landscape Architecture** Fall. 2 credits.

L. J. Mirin.

**\*521 History of Landscape Architecture I** Fall. 3 credits.

L. J. Mirin.

**\*522 History of Landscape Architecture II**

Spring. 3 credits.

L. J. Mirin.

**\*530 Urban Landscape Planning and Design**

Spring. 3 credits.

L. J. Mirin.

**531 Regional Landscape Planning I** Fall.

3 credits. Prerequisite: permission of instructor.

Lecs, M W F 10:10. A. S. Lieberman.

Regional landscape planning strategies and methods that have been developed and employed in North America, Europe, Australia, and the Middle East. Presented through a series of lectures, readings, class discussions, exercises, and review of case studies. This course is intended for graduate students in landscape architecture, architecture, city and regional planning, ecology, international studies, international agriculture, and natural resources.

**532 Regional Landscape Planning II** Spring.

3 credits. Prerequisite: permission of instructor.

Lecs, M W F 10:10. A. S. Lieberman.

Vegetation analysis techniques and methods applied to comprehensive land-use planning and consideration of the environmental uses of plants in regional landscape planning. Landscape functions of vegetation at the regional scale are addressed through review of case studies in North America, Europe, the Middle East, and Australia.

**601–602 Studio: Regional Landscape Planning**

Fall, 601, weeks 1–7, 3 credits; 602, weeks 8–14, 3 credits. One or both courses may be taken.

Prerequisite: permission of instructor. Lab fee, \$10 per seven week course; cost of drafting supplies, about \$50 per course; expenses for field trip in 601, about \$200.

Lecs, M W F 1:25; studios, M W F 2:30–4:25.

Required 5-day field trip in 601. P. J. Trowbridge.

Application of regional landscape planning methods and techniques; management and planning within watersheds, other physiographic units, and politically defined landscapes.

**603–604 Studio: Urban Design** Fall. 603, weeks

1–7, 3 credits; 604, weeks 8–14, 3 credits. One or both courses may be taken. Prerequisite: permission

of instructor. Lab fee, \$10 per seven week course; cost of drafting supplies, about \$50 per course; expenses for field trip in 603, about \$200.

\*Offered through the College of Architecture, Art, and Planning.

Lecs, M W F 1:25; studios, M W F 2:30–4:25.

Required 5-day field trip in 603. R. T. Trancik.

Application of town-planning and urban-design techniques to specific field problems. Timely urban issues are investigated, including physical design considerations as well as the complex socioeconomic implications of urban design. Site-development problems at several scales and land-use intensities are examined.

**606 Studio: Interdisciplinary Site Planning**

Spring. 6 credits. Prerequisite: permission of instructor. Lab fee, \$20; cost of drafting supplies, about \$100.

Lecs, M W F 1:25; studios, M W F 2:30–4:25.

T. H. Johnson.

Emphasis in this studio includes methods of conceptualizing design and the application of design principles to multidisciplinary professional projects.

**607 Studio: Professional Practice** Fall, weeks

1–7, 3 credits. Prerequisite: permission of instructor. Lab fee, \$10; cost of supplies, about \$50; basic expenses for field trip, about \$200.

Lecs, M W F 1:25; studios, M W F 2:30–4:25.

Required 5-day field trip. M. I. Adleman.

Comprehensive professional procedures involved in the design process, including client contact, project definition, design synthesis, design development, contract documentation, construction administration, and continuing landscape management.

**609 Studio: Advanced Site Design** Fall, weeks

8–14, 3 credits. Prerequisite: permission of instructor. Lab fee, \$10; cost of supplies, about \$50.

Lecs, M W F 1:25; studios, M W F 2:30–4:25.

M. I. Adleman.

Site design, and construction with a particular focus on the principles and process of site grading and the further development of site grading skills.

**\*621 Summer Internship Seminar** Fall. 2 credits.

L. J. Mirin.

**634 Landscape Architectural Research** Spring.

3 credits.

T R 2–4. T. H. Johnson.

This course will survey research methodologies while focusing on types of prescriptive research used by professional offices and academic departments of landscape architecture. The course will also examine environmental impact statements as a mandated way of asking and answering questions concerning proposed environmental change.

**\*650 Fieldwork or Workshop in Landscape**

**Architecture** Fall or spring. 1–5 credits; may be repeated for credit. S-U grades optional.

L. J. Mirin.

**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.

## Food Science

J. E. Kinsella, chairman; J. G. Babish, R. C. Baker, D. K. Bandler, D. M. Barbano, D. H. Beermann, D. C. Graham, R. B. Gravani, L. F. Hood, J. H. Hotchkiss, W. K. Jordan, F. V. Kosikowski, R. A. Ledford, F. W. Liu, D. D. Miller, N. N. Potter, J. M. Regenstein, G. E. Rehkugler, S. S. H. Rizvi, J. W. Sherbon, W. F. Shipe, Jr., J. R. Stouffer, R. R. Zall

**100 Introductory Food Science** Fall. 3 credits.

M W F 10:10. N. N. Potter.

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.

**101 Topics in Food Science** Fall. 1 credit. Limited to food science majors taking Food Science 100. Prerequisite: Food Science 100. A required companion course to Food Science 100.

Lec and disc, F 11:15. N. N. Potter and staff. Members of the staff lecture and lead discussion on selected topics.

**150 Food Choices and Issues** Spring. 2 credits S-U grades optional.

Lecs, T R 12:20. W. F. Shipe, D. Miller, and staff. Deals with our nutritional needs and the nutrient content of foods. Issues pertaining to diets, food processing, quality, and safety are discussed.

**210 Food Analysis** Spring. 3 credits. Prerequisite: Chemistry 104 or 208.

Lecs, W F 12:20; lab, F 1:25–4:25 or M 7:30–10:30 p.m. J. W. Sherbon.

Designed to acquaint the student with chemical tests used by food analysts. Emphasis is on understanding and use of good analytical techniques, including gravimetric, volumetric, and spectrophotometric methods. Procedures for screening, routine quality control, and official tests for fats, proteins, carbohydrates, and selected minor nutrients are introduced.

**220 Food Science for Industry** Fall. 2 credits

Lec and lab, F 12:20–4:25. Field trips. R. C. Baker. Provides understanding of food industry operations. Half the laboratories are production of food products (such as sausages and pastries) by students and half are visits to commercial plants producing those products. One or two longer field trips may be offered.

**247 Postharvest Food Systems** Fall. 2 credits Prerequisite: freshman chemistry. Recommended: Food Sciences 100. S-U grades optional.

T R 10:10. M. C. Bourne. This interdisciplinary course describes various courses of postharvest food losses in developing countries and methods available to reduce the losses. Designed for all students in agriculture. Emphasis on cereal grains. Biology and control of rodents, birds, insects, and molds in stored foods, chemical causes of quality loss, simple drying and storage practices, effects of climate. Economic and social factors affecting food preservation and storage technology are discussed.

**301 Nutritional Aspects of Raw and Processed Foods (also Nutritional Sciences 301)** Spring 3 credits. Prerequisites: Nutritional Sciences 115 and organic chemistry or permission of the instructor.

M W F 9:05. D. Miller. An evaluation of the nutritional qualities of human foods, with an emphasis on changes that occur during processing and storage. Topics include methods and approaches for nutrition evaluation of foods and diets, nutrient stability, nutrient availability, food composition, processing methodology, nutritional significance of selected commodities, food fortification, and food additives.

**304 Food Sanitation as Related to Public Health, Food Plant Processing, and Quality Assurance Programs** Spring. 3 credits. Prerequisite: Food Science 100.

Lecs, T R 9:05; lab, R 1:25. R. R. Zall. Deals with measures essential in producing and processing wholesome and safe foods. Rules and regulations of the Food and Drug Administration, the U.S. Department of Agriculture, and other organizations important to the food industry are covered. Field trips and invited speakers are selected to demonstrate the use of sanitary principles.

**311 Milk and Frozen Desserts** Fall. 2 credits Prerequisite: Food Science 322 or permission of instructor. Offered alternate years.

Lec, W 12:20; lab, W 1:25. W. K. Jordan, R. R. Zall. 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. Field trips to processing plants supplement the lectures and laboratory work.

**312 Technology of Poultry, Fish, and Other Meats** Spring. 2 credits. Prerequisite: organic chemistry.

Lec, T 9:05; lab, R 8–9:55. J. M. Regenstein. This course is intended to give a unified introduction to the technology used with poultry, seafood, and other meats and to relate the underlying chemistry, biochemistry, and physiology of muscle to these technologies. Government involvement in these industries will also be discussed.

**321 Food Engineering I** Fall. 3 credits.

Prerequisites: physics and Food Science 100.

Lecs, M W 11:15; lab, M 1:25. W. K. Jordan. Intended to give food science students an introduction to the engineering aspects of food plant operations and equipment. Deals with materials, power, fluid flow, heat transfer, steam, and refrigeration as used in food processing.

**322 Food Processing I** Spring. 4 credits.

Prerequisites: Food Science 100, 320 and Microbiology 290, 291.

Lecs, T R 10:10–12:05; lab, T 1:25–4:25.

N. N. Potter, W. K. Jordan, R. R. Zall. Deals with the principles and practices of concentration, drying, freezing, and waste management applied to foods. Current processing methods and their relations to the chemistry, microbiology, and technology of raw materials and final products are discussed.

**351 Milk Quality** Spring. 1 credit. Prerequisite: Animal Science 250 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.

**394 Food Microbiology Lectures** Spring. 2 credits. Prerequisites: Microbiology 290 and 291. M W 12:20. R. A. Ledford.

The major families of microorganisms of importance in foods are studied systematically, with emphasis on the roles of these organisms in food preservation, food fermentations, and public health.

**395 Food Microbiology Laboratory** Spring.

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 isolating and characterizing organisms of importance in foods.

**[401 Concepts of Product Development]** Spring 2 credits. Prerequisite: Food Science 100 or equivalent. S-U grades optional. Offered alternate years. Not offered 1983–84.

M W 10:10. 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.]

**[402 Product Development Laboratory]** Spring. 2 credits. Limited to food science majors. Prerequisite: concurrent registration in Food Science 401 and permission of instructor. S-U grades optional. Offered alternate years. Not offered 1983–84.

Labs, M W 1:25–4:25. Emphasis is on gaining practical experience in the development of new foods.]

**[403 International Food Science and Development]** Fall. 3 credits. Offered alternate years. Not offered 1983–84.

Lecs, T R 11:15; disc, R 1:25–4:25. F. V. Kosikowski.

A critical evaluation of man's needs for food in the world and the international food technologies, organizations, and policies to meet such needs. Novel extrusion, ultrafiltration, and fermentation food processes and basic nutrient foods for developing countries are described. The making of representative high-energy and protein foods, including soybean milk, tofu, sufu, and tempeh is demonstrated.]

**406 Food Processing Fermentations Lectures**

Fall. 3 credits. Prerequisite: background in microbiology. Offered alternate years.

Lecs, T R 11:15; disc, R 1:25–4:25. F. V. Kosikowski.

Principles and practices of viniculture and enology, cheese and cultured-milk technology, and related fermentations. Taste evaluations and illustrated descriptions of wines, beers, cheeses, cultured milks, and exotic fermented foods are included.

**408 Food Processing Fermentations Laboratory**

Fall. 2 credits. Enrollment limited. Prerequisite: concurrent registration in Food Science 406. Offered alternate years.

Lab, T 1:25–4:25. F. V. Kosikowski. Laboratory exercises and demonstrations in the making of wines, beers, cheeses, cultured milks, and vegetable foods. A field trip provides additional experience.

**409 Food Chemistry** Fall. 3 credits. Prerequisite: Biological Sciences 330 or 331.

Lecs, T R 8–9:25. W. F. Shipe, L. F. Hood, J. E. Kinsella, J. M. Regenstein, J. P. VanBuren. Deals with the relationship between the chemical composition and properties of foods. Attention is given to the interactions among the components of food.

**410 Sensory and Objective Evaluations of Foods** Spring. 3 credits. Prerequisite: statistics.

Lecs, M W F 11:15. W. F. Shipe. Deals with the sensory techniques used in evaluating the flavor, color, and texture of foods and the effects of these properties on consumer acceptance. Objective methods for measuring these qualities, and appropriate statistical methods for analyzing the subjective and objective results and establishing a quality-control program.

**[411 Food Mycology]** Fall. 3 credits. Prerequisite: Microbiology 290 or 291 or equivalent. Recommended: Microbiology 394. Offered alternate years. Not offered 1983–84.

Lecs, T R 10:10; 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, culture and isolation, identification of fungi, and isolation and quantification of fungal toxins.]

**[413 Function of Food Ingredients]** Spring 1 credit. Prerequisite: Food Science 409. S-U grades optional. Offered alternate years. Not offered 1983–84.

Lec, F 10:10. Intended for food science majors anticipating product development, production, or quality-control assignments in the food industry. Functional

properties of classes of ingredients and their potential interactions with other food constituents are discussed. Guest lecturers from ingredient suppliers participate.]

**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 material used to construct packaging are discussed. Specific packages currently used for individual food commodity groups are also presented with emphasis on newer technologies. Economics, design, and regulation of food packaging are briefly presented.

**416 Food Packaging Laboratory** Spring.  
2 credits. Prerequisite: Food Science 415.

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. Mathematical modeling will be employed when appropriate. Students will design and build a new food package.

**419 Food Chemistry Laboratory** Fall. 2 credits.  
Prerequisites: Biological Sciences 330 or 331 and concurrent registration in Food Science 409.

Lab, T 1:25–4:25. D. Miller.  
Intended to complement Food Science 409 in developing an understanding of the chemistry of food. Laboratory exercises deal with the chemical properties of food components and changes these components undergo in processing and storage. The relationship between the chemical composition of foods and functional, nutritional, and organoleptic properties is stressed.

**421 Food Processing II** Fall. 3 credits.  
Prerequisite: Food Science 322.

Lecs, T R 10:10; lab, F 1:25. J. E. Kinsella, M. A. Rao, S. S. H. Rizvi.  
Principles and practices of thermal processing of foods, with emphasis on kinetics of destruction of microorganisms and quality factors, and chemistry and processing of fats and oils. Laboratory measurement of kinetic data, retort processing, lethality evaluation, and fat and oil processing techniques.

**422 Food Engineering II** Spring. 3 credits.  
Prerequisite: Food Science 421.

Lecs, W F 10:10; lab, F 1:25–4:25. M. R. McLellan, S. S. H. Rizvi.  
Application of thermodynamic principles, mass transport, and related unit operations to food processes. Engineering aspects of food plant operations and automation, with emphasis on future directions. Laboratory includes theoretical computation and a number of experiments on process controls.

**497 Special Topics in Food Science** Fall or spring. 3 credits maximum. Prerequisite: permission of instructor. 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.

**499 Undergraduate Research in Food Science**

Fall or spring. 4 credits maximum. S-U grades optional. Students must attach to their course enrollment material written permission from the staff member who will supervise the work and assign the grade. Except for students enrolled in the honors program, credit will be limited to 4 credits total.  
Hours to be arranged. Staff.  
Independent study.

**600 Seminar** Fall or spring. 1 credit. Required of all food science graduate students. S-U grades only.

**601 Food Protein Chemistry** Fall. 3 credits  
Limited to graduate students and to seniors with permission of the instructor. Prerequisite: Food Science 409 or its equivalent.

Lec, M W F 10:10. J. M. Regenstein.  
The chemistry and physical chemistry of proteins are discussed. Important proteins of food systems are examined in terms of methodology currently used in protein chemistry for characterization and purification. Interactions of proteins with other food components are also covered.

**603 Food Carbohydrates** Spring. 2 credits.  
Limited to qualified seniors and graduate students. Prerequisite: Biological Sciences 330 or equivalent. Offered alternate years.

Lecs, T R 10:10. R. S. Shallenberger and staff.  
A consideration of the chemistry of carbohydrates in foods, including sugars, starches, pectins, gums, and cellulose. Emphasis is on their intrinsic chemistry, their origins in raw materials, and the subsequent changes occurring during processing and storage.

**[604 Chemistry of Dairy Products]** Fall. 2 credits.  
Prerequisites: organic chemistry, biochemistry, and knowledge of dairy-product manufacturing procedures. Offered alternate years. Not offered 1983–84.

Lecs, T R 12:20. 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.]

**606 Instrumental Methods** Fall. 5 credits.  
Prerequisite: permission of instructor.

Lec, M W F 8; lab, W or R 1:25–4:25.  
J. W. Sherbon.  
Deals with instrumental methods widely used in research and industry. Included are chromatography, spectroscopy, electrophoresis, thermal analysis, and the use of computers. The stress is on the theoretical and practical aspects of the material presented.

**608 Food Color and Food Pigments** Fall. 1 credit  
Prerequisite: organic chemistry. Offered alternate years.

Lec, F 11:15. J. P. VanBuren.  
A survey of chemical and physical properties of the major intrinsic food pigments and their stability during processing and storage. Chemical and physical origins of color. Food color as an indicator of other food qualities. Color and pigments of selected commodities are examined.

**609 Rheology** Fall. 1 credit. Offered alternate years.

Lec, T 12:20. M. C. Bourne.  
Fundamental concepts of rheology applied to foods, with emphasis on objective methods for measuring textural properties. Principles and practice involved in measuring texture, viscosity, texture profiling, and consistency; instrumentation and correlations between objective and sensory methods of texture measurements. Examples of rheological problems in each major food group.

**610 Introductory Chemical Toxicology** Fall. 2 credits. Prerequisites: biochemistry and animal physiology. Offered alternate years.

Lec, T R 11:15. G. S. Stoewsand, J. G. Babish, D. J. Lisk.  
An introduction to the concepts and essentials of toxicology; discussions will include sources, modes of toxicity, harmful effects, and remedial measures as they pertain to humans and the whole environment. Toxicants will include pesticides, heavy metals, air pollutants, industrial poisons, natural toxicants, food additives, drugs, social poisons, and ionizing radiation.

**[614 Mathematical Evaluation of Processed Packaged Foods]** Spring. 3 credits. Offered alternate years. Not offered 1983–84.

Lec and disc. R 2–4:25.  
Mathematical methods used to evaluate the thermal processing of packaged foods are presented in depth. These techniques are used in predicting shelf life and nutrient loss.]

**[615 Secondary Plant Metabolites in Foods]** Fall. 1 credit. Prerequisite: Biological Sciences 330 or 331. Offered alternate years. Not offered 1983–84.

Lec, F 12:20. G. Hrazdina.  
Deals with the chemistry and biochemistry of secondary plant metabolites (chlorophyll, lignin, flavonoids, alkaloids, terpenes, carotenoids, steroids, and cyanogenic glycosides) and their importance to food products. Emphasis is on the chemical and biochemical properties of these compounds, their occurrence in edible plants, their reactions, and influence on food products.]

**[701 Engineering Properties of Foods]** Fall. 2 credits. Prerequisites: Food Science 422 and Chemistry 287, 288. Offered alternate years. Not offered 1983–84.

Lecs, T R 12:20. M. A. Rao, S. S. H. Rizvi.  
Theories and methods for measuring physical and engineering properties of foods and biomaterial systems. Mathematical techniques for analyzing, modeling, and applying biological factors in engineering calculations and process designs will be emphasized.

**Related Courses in Other Departments**

**Marketing (Agricultural Economics 240)**

**Food Industry Management (Agricultural Economics 443)**

**Introduction to Agricultural Engineering and Computing (Agricultural Engineering 151)**

**Engineering Design and Analysis of Food Processing Equipment (Agricultural Engineering 466)**

**Meat and Meat Products (Animal Science 290)**

**Commercial Meat Processing (Animal Science 490)**

**Advanced General Microbiology Lectures (Microbiology 390)**

**Postharvest Handling and Marketing of Vegetables (Vegetable Crops 312)**

## International Agriculture

**300 Perspectives in International Agriculture and Rural Development** Fall. 2 credits. S-U grades optional.

F 1:25–3:20. Staff.  
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.

**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.

**600 Seminar: International Agriculture** Fall and spring. No credit. S-U grades only.

Third and fourth W of each month, 4–5. Staff.

The seminar focuses on developing an understanding of the nature and interrelatedness of agricultural development and the social sciences, plant and animal sciences, foods and nutrition, and natural resources.

**602 Special Studies of Problems of Agriculture in the Tropics** Spring. 3 credits. Prerequisites: an international agriculture course and permission of instructors. Cost of field-study trip, estimated at \$800 for lodging, meals, personal expenses, and transportation.

R 2:30–4:25. Staff.

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.

**603 Administration of Agricultural and Rural Development (also Government 692 and Business and Public Administration NCE 514)** Spring. 3 credits. S-U grades optional.

T 2:30–5:30. M. L. Barnett, M. J. Esman, E. B. Oyer, N. T. Uphoff, L. W. Zuidema.

An intercollege course designed to provide graduate students 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.

**604 Seminar on African Agriculture and Rural Development** Spring. 2 credits. S-U grades optional.

M 1:25–3:20. F. W. Young.

Strategies for increasing food production and raising rural incomes in Africa. Topics include cropping systems in Africa and the role of agricultural technology in increasing yields and improving livestock production; strategies for improving human nutrition; food storage and mechanization; rural employment projects; alternative rural development strategies; and experience with World Bank and other internationally funded rural development projects.

**605 Chinese Agricultural and Rural Development** Fall. 3 credits. S-U grades optional. T R 12:20–2:15. Staff.

A multidisciplinary seminar dealing with the economic, social, and technical aspects of agricultural modernization in China. The course will explore changing strategies for agricultural and rural development and review the China experience against developmental efforts in other countries.

**606 Farming Systems Research** Fall. 3 credits. S-U grades optional.

T 2:30–4:25, R 12:30–1:25. R. Barker, M. Barnett, H. C. Wien.

An interdisciplinary course focusing on the development of agricultural technologies and policies designed to assist small-scale farmers in developing countries. Techniques for gathering information, specifying research problems, and analyzing and interpreting data will be explored. The involvement of farmers in the research process is stressed.

**650 Special Topics in International Agricultural and Rural Development** Fall and spring. 1–3 credits. S-U grades optional.

Staff

A seminar on current themes of agricultural and rural development. Specific content varies each semester.

**703 Seminar for Special Projects in Agricultural and Rural Development** 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. Hours to be arranged. Staff.

The seminar provides students 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

**Economics of Agricultural Geography (Agricultural Economics 150)**

[Agricultural Trade Policy (Agricultural Economics 430) Not offered 1983–84.]

**Economics of Agricultural Development (Agricultural Economics 464)**

**Food, Population, and Employment (Agricultural Economics 660–661)**

[Macroeconomic Issues in Agricultural Development (Agricultural Economics 663) Not offered 1983–84.]

**Microeconomic Issues in Agricultural Development (Agricultural Economics 664)**

**Seminar on Latin American Agricultural Policy (Agricultural Economics 665)**

**Seminar in Agricultural Development (Agricultural Economics 666)**

[Seminar on Agricultural Trade Policy (Agricultural Economics 730) Not offered 1983–84.]

[Export Marketing (Agricultural Economics 743) Not offered 1983–84.]

**Agricultural Mechanization: An International Perspective (Agricultural Engineering 211)**

**Production of Tropical Crops (Agronomy 314)**

**Geography and Appraisal of Soils of the Tropics (Agronomy 471)**

**Management Systems for Tropical Soils (Agronomy 480)**

**Livestock Production in Warm Climates (Animal Science 400)**

**Forages of the Tropics for Livestock Production (Animal Science 403)**

**Seminar in Science and Technology Policy in Developing Nations (City and Regional Planning 771)**

**Seminar in Policy Planning in Developing Nations: Technology Transfer and Adaptation (City and Regional Planning 772)**

**Seminar in Project Planning in Developing Countries (City and Regional Planning 773)**

**Intercultural Communication (Communication Arts 601)**

**Communication in the Developing Nations (Communication Arts 624)**

**Designing Extension and Continuing Education Programs (Education 681)**

**Community Education (Education 682)**

**Behavioral Change in International Rural Modernization (Education 782)**

**Comparative Extension Education (Education 783)**

**Arthropods of World Importance (Entomology 341)**

**Postharvest Food Systems (Food Science 247)**

[International Food Sciences and Development (Food Science 403) Not offered 1983–84.]

**Political Economy of Change: Rural Development in the Third World (Government 648)**

**Regional Landscape Planning I (Landscape Architecture 531)**

**Regional Landscape Planning II (Landscape Architecture 532)**

**National and International Food Economics (Nutritional Sciences 457)**

**International Nutrition Problems, Policy, and Programs (Nutritional Sciences 680)**

**Seminar in International Nutrition and Development Policy (Nutritional Sciences 695)**

**Special Topics in International Nutrition (Nutritional Sciences 699)**

**Plant Diseases in Tropical Agricultural Development (Plant Pathology 655)**

**Economic Fruits of the World (Pomology 208)**

**Rural Sociology and World Development Problems (Rural Sociology 105)**

[Social Indicators and Data Management in Poor Countries (Rural Sociology 213) Not offered 1983–84.]

**Rural Development and Cultural Change (Rural Sociology 355)**

**Subsistence Agriculture in Transition (Rural Sociology 357)**

**Rural Social Stratification (Rural Sociology 445)**

[Contemporary Sociological Theories of Development (Rural Sociology 606) Not offered 1982–83.]

**Social Organization of Agriculture (Rural Sociology 650)**

[Rural Development Information Systems (Rural Sociology 715) Not offered 1983–84.]

[Social Movements in Agrarian Society (Rural Sociology 723) Not offered 1983–84.]

**Sociotechnical Aspects of Irrigation (Rural Sociology 754)**

## 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 pp. 58–59.

## Microbiology

R. P. Mortlock, chairman; E. A. Delwiche, N. C. Dondero, W. C. Ghiorse, E. P. Greenberg, C. M. Rehkugler, P. J. VanDemark, S. H. Zinder

**290 General Microbiology Lectures** Fall, spring, or summer. 3 credits. Prerequisites: Biological Sciences 101–102 and 103–104 and Chemistry 104

or 208. Recommended: concurrent registration in Microbiology 291.

M W F 9:05 (spring only) or 11:15. Evening exam: spring, Feb. 23, March 20, Apr. 26. Fall, W. C. Ghiorse; spring, P. J. VanDemark; summer, staff.

A study of the basic principles and relationships in the field of microbiology, with fundamentals necessary for further work in the subject.

**291 General Microbiology Laboratory** Fall, spring, or summer. 2 credits. Prerequisite:

Microbiology 290 (may be taken concurrently).

M W 2–4:25 or 7–9:30 p.m. (spring only), or T R 8–10:30, 11:15–1:45, or 2–4:25. Fall, W. C. Ghiorse; spring, P. J. VanDemark.

A study of the basic principles and techniques of laboratory practice in microbiology, and fundamentals necessary for further work in the subject.

**292 General Microbiology Discussion** Spring.

1 credit. Prerequisite: Microbiology 290 (may be taken concurrently). S-U grades only.

Hours to be arranged. P. J. VanDemark.

A series of discussion groups in specialized areas of microbiology to complement Microbiology 290.

**314 Tissue Culture Techniques and Applications**

Fall. 2 credits. Prerequisites: Microbiology 290 and 291 or permission of instructor.

F 1:25–3:30; 3 lab exercises scheduled on a rotating basis, F 3:30–5:30. C. M. Rehkugler.

A series of lectures and demonstrations dealing with cell culture methods, especially those required to culture cells of plants and 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.

**336 Applied and Industrial Microbiology** Fall.

3 credits. Prerequisites: Microbiology 290 and organic chemistry.

T R 10:10–11:25. E. A. Delwiche, N. C. Dondero, and staff.

A survey of the microbiology of industrial fermentations and public health aspects of water and wastewater.

**390 Advanced General Microbiology Lectures**

Spring. 2 credits. Prerequisites: Microbiology 290 and 291 and organic chemistry. May be taken independently of Microbiology 391.

M W 11:15. S. H. Zinder.

A consideration of the physiology, morphology, genetics, culture, and taxonomy of important groups of bacteria.

**[391 Advanced General Microbiology**

**Laboratory** Spring. 2 credits. Prerequisites: Microbiology 390 (may be taken concurrently) and permission of instructor. Not offered 1983–84.

M W 2–4:25. S. H. Zinder.

Intended as a laboratory complementing Microbiology 390. The isolation, characterization, and study of bacteria included in Microbiology 390.]

**412–413 Clinical Microbiology** 412 fall; 413

spring. Credits to be arranged. Prerequisite: permission of instructor.

Hours to be arranged. R. P. Mortlock, P. J. VanDemark.

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 will be upon developing the student's 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.

**422 Aquatic Microbiology** Spring. 3 credits.

Prerequisites: Microbiology 290 or Agronomy 406, and organic chemistry.

T R 10:10–11:25. N. C. Dondero.

A consideration of the relation of microorganisms, especially the bacteria, to aquatic environments, both natural and artificial. The microbiology of wastewaters is included. Attention is given to fundamental biological concepts and to applied aspects of the occurrence and activities of microorganisms in water.

**[466 Microbial Ecology** Spring 3 credits.

Prerequisite: an elementary course in some facet of microbiology. Offered alternate years. Not offered 1983–84.

M W F 10:10. M. Alexander.

An introduction to the basic principles of microbial ecology. Attention is given to the behavior, activity, and interrelationships of bacteria, fungi, algae, and protozoa in natural ecosystems.]

**480 Microbial Physiology Lectures** Spring.

3 credits. Prerequisites: Microbiology 290 and 291 and biochemistry. S-U grades optional.

M W F 11:15. R. P. Mortlock.

The concern is with the physiological 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.

**481 Microbial Physiology Laboratory** Spring

3 credits. Limited to 12 students. Prerequisites: Microbiology 480 (may be taken concurrently) and permission of instructor. S-U grades optional.

T R 12:20–4:25. R. P. Mortlock.

The laboratory component of Microbiology 480. Deals with laboratory experiments and techniques used in studying the physiological characteristics of microorganisms.

**484 Prokaryotic Cytology Lectures** Spring.

3 credits. Prerequisites: Microbiology 290 and 291, and biochemistry. S-U grades optional. Offered alternate years.

M W F 9:05. W. C. Ghiorse.

Morphology, ultrastructure, and life cycles of prokaryotic organisms are considered with regard to chemical composition and physiological function.

**485 Prokaryotic Cytology Laboratory** Spring

2 credits. Enrollment limited. Prerequisite: Microbiology 484 or concurrent enrollment, and permission of instructor. Offered alternate years.

Hours to be arranged. W. C. Ghiorse.

Cytological and cytochemical techniques, including preparations for light and electron microscopy, that are especially applicable to the study of prokaryotic cells.

**486 Selected Topics in Microbial Metabolism**

Spring. 2 credits. Primarily for upperclass and graduate students. Prerequisites: beginning courses in general microbiology, biochemistry, and organic chemistry. S-U grades optional.

T R 11:15. E. A. Delwiche.

Selected topics pertaining to the energy metabolism, oxidative and fermentative abilities, and biosynthetic capacities of microorganisms. Where possible and appropriate, the subject matter compares the various microbial forms.

**497 Special Topics** Fall. 1 credit. Limited to

upperclass students specializing in microbiology who may desire to take Microbiology 499. Prerequisite: permission of instructor. S-U grades only. The course cannot be used to fulfill the specialization requirement.

Hours to be arranged. Staff.

**498 Teaching Experience** Fall or spring.

1–3 credits. Enrollment limited. Prerequisites: previous enrollment in the course to be taught or equivalent, and written permission of instructor. S-U grades with permission of instructor.

Hours to be arranged. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and teaching microbiology courses under supervision of departmental faculty. This experience may include leading a discussion group; preparing, assisting, or teaching a microbiology laboratory; or tutoring. Microbiology courses currently offering such experience include 291 and 292. This course cannot be used to fulfill the specialization requirement.

**499 Research in Microbiology** Fall or spring.

Variable credit. Undergraduates must attach to their course enrollment material written permission of the staff member who will supervise the work and assign the grade. This course cannot be used to fulfill the specialization requirement.

Hours to be arranged. Staff.

**691 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 will be expected to lead discussions on recent primary literature in microbiology. S-U grades only.

Hours to be arranged. Staff.

**694 Bacterial Diversity** Spring. 4 credits.

Prerequisites: either Microbiology 390, 392, or 480, and Biological Sciences 330 or 331 or equivalent.

M W 12:20–4:25. E. P. Greenberg.

Physiology, ecology, and morphology of selected groups of bacteria, including the methanogenic bacteria, spirochetes, nitrogen-fixing bacteria, photosynthetic bacteria, thermophilic bacteria, myxobacteria, and others. Behavior of bacteria in response to environmental stimuli.

**699 Microbiology Seminar** Fall and spring

Required of all graduate students majoring in microbiology and open to all who are interested.

Hours to be arranged. Staff.

**791 Graduate Research Seminar in**

**Microbiology** Fall and spring. 1 credit each semester. Required of all graduate students in the graduate field of microbiology; a seminar relating to the research activities of those enrolled. Students who have completed the Microbiology 691 series requirement are required to present a seminar concerning their research interests and activities at least once each year. S-U grades only.

Hours to be arranged. Staff.

**Related Courses in Other Departments**

**Soil Microbiology (Agronomy 406)**

**Advanced Soil Microbiology (Agronomy 606)**

**Insect Pathology (Entomology 453)**

**Food Microbiology Lectures (Food Science 394)**

**Food Microbiology Laboratory (Food Science 395)**

**Food Mycology (Food Science 411)**

**Basic Immunology, Lectures (Veterinary Medicine 315, also Biological Sciences 305)**

**Basic Immunology, Laboratory (Veterinary Medicine 316, also Biological Sciences 307)**

**Pathogenic Microbiology (Veterinary Medicine**

**317)** Spring. 4 credits. Primarily for graduate and undergraduate microbiology majors. Limited to 48 students. Prerequisites: Microbiology 290, 291, and Veterinary Medicine 315; or permission of instructor. Recommended: Veterinary Medicine 316.

Lec, T R 1:05; lab, T R 2:05–4:25. G. M. Dunny, J. H. Gillespie, K. M. Lee.

Two-part course in medical microbiology, covering pathogenic bacteriology and virology. One important principle emphasized in both portions of the course is that disease is the product of the interaction of host, pathogen, and environment.

**Microbial Genetics, Lectures (Biological Sciences 485)**

**Microbial Genetics, Laboratory (Biological Sciences 486)**

**Advanced Immunology, Lectures (Veterinary Medicine 705)**

**[Advanced Immunology, Laboratory (Veterinary Medicine 706) Not offered 1983–84]**

**Advanced Work in Bacteriology, Virology, or Immunology (Veterinary Medicine 707)**

**Advanced Animal Virology, Lectures (Veterinary Medicine 708)**

**Advanced Animal Virology, Laboratory (Veterinary Medicine 709)**

**Immunopathology and Clinical Immunology (Veterinary Medicine 712)**

**[Protozoan Parasite Structure and Function (Veterinary Medicine 765) Spring, 2 credits. Prerequisite: basic biochemistry. Offered alternate years. Not offered 1983–84.**

Hours to be arranged. D. G. Lindmark. This course will be given in a tutorial format with the emphasis on current literature. The course will encompass the metabolism and the structural and functional relationships central to parasite metabolism. An integral part of the course will involve an in-depth treatment of research techniques unique to working with and understanding parasite biochemical cytology. Where appropriate, the mode of action of chemotherapeutic agents used in the treatment of parasite-caused diseases will be investigated.]

## Natural Resources

R. T. Oglesby, chairman; R. A. Baer, H. B. Brumsted, J. W. Caslick, T. J. Fahey, T. A. Gavin, S. P. Gloss, E. E. Hardy, R. A. Howard, T. L. Hullar, J. W. Kelley, J. P. Lassoie, D. A. McCrimmon, R. J. McNeil, R. A. Malecki, A. N. Moen, M. E. Richmond, C. L. Schofield, C. R. Smith, D. A. Webster, L. H. Weinstein, B. T. Wilkins, W. D. Youngs

**200 Principles of Conservation** Fall, 3 credits. Limited to natural resources majors. Not open to students who have passed Natural Resources 201. Lecs, M W F 10:10; 1-hour disc to be arranged. R. J. McNeil.

Principles of environmental conservation and application of those principles to the management of natural resources. Ecological concepts, a survey of the natural resources and their properties, and resource management concepts are considered. Social, political, legal, economic, and ethical aspects of environmental issues are discussed.

**201 Environmental Conservation** Spring 3 credits. Not open to students who have passed Natural Resources 200.

Lecs, M W F 10:10; 1-hour disc to be arranged. R. J. McNeil.

A survey course intended for students in any year and major. People, natural resources, and environment. Ecological principles as applied to human use of environment; survival strategies of animals and the application of these concepts to human use and misuse of environment; a survey of natural resources and problems related to their management. Current issues such as air and water pollution, disposal of radioactive wastes, human population pressures, energy supply and management, and life-style are considered. Social, political, legal, economic, and ethical aspects of environmental concerns are introduced.

**210 Introductory Field Biology** Fall, 3 credits. Limited to 45 students. Admission given to sophomores and juniors with an adviser in natural resources or by permission of instructor. Prerequisites: Biological Sciences 101 and 102 or equivalent. Cost of field trips, no more than \$10.

Lec, W 9:05; labs, M W 1:25–4:25. Two overnight field trips. T. A. Gavin.

Introduction to methods of inventorying and identifying plants and animals. Recognition and knowledge of approximately 150 species of vertebrates and 75 species of woody plants found in New York State will be covered. Selected aspects of current ecological thinking relevant to problems in assessment of the distribution and abundance of organisms are stressed. The interaction of students with biological events in the field and accurate recording of these events are emphasized.

**250 Introductory Wildlife Biology** Spring, first third of term. 1 credit. Prerequisite: Natural Resources 210 or permission of instructor.

Lecs, M W F 8. A. N. Moen. Introduction to the biological characteristics of wildlife species, with analyses of these characteristics in relation to ecology and management.

**251 Introductory Fishery Biology** Spring, middle third of term. 1 credit. Prerequisites: Natural Resources 210 or permission of instructor.

Lec, M W F 8. Staff. Importance of basic life history, ecology, and measurable parameters as a basis for fishery management. Representative commercial and recreational fisheries will be used as examples.

**252 Introductory Forestry** Spring, last third of term. 1 credit. Prerequisite: Natural Resources 210 or permission of instructor.

Lecs, M W F 8; field trip, all day on one S. T. Fahey. Appreciation of forests as a natural resource. Importance of ecology and measurement as bases for forest management. Introduction to tree biology and silviculture.

**260 Introduction to Consumptive Wildlife Recreation** Fall, 2 credits. Limited to 30 students. Prerequisites: natural resources majors or permission of instructor. Cost of overnight field trip, no more than \$10.

Lecs, M-F 9:05. Overnight field trip and 1 evening lab. R. A. Howard.

Brief history of trapping and hunting; role of consumptive recreationists in conservation; firearms and archery nomenclature, function, ballistics, and safety; content of New York State hunter training, bowhunter education, and trapper training courses; discussion of current methods, laws, ethics, basic shooting instruction with rifles and shotguns; field exercise at Arnot Forest.

**302 Forest Ecology** Fall, 3 credits. Cost of trip, no more than \$20.

Lecs, M W 11:15; lab, M 12:20–4:25; 1 weekend trip S through M. T. J. Fahey.

Analysis of the distribution, structure, and dynamics of forest ecosystems. All laboratory sessions in the field. One weekend field trip to the Adirondacks or other forest region.

**305 Maple Syrup Production** Spring 1 credit. Limited to 20 students. Prerequisite: permission of instructor. S-U grades only.

T 12:20–4:25 (3 preliminary seminars, followed by several half-days of fieldwork during the maple season). J. Kelley, A. Fontana.

Students work in most phases of the Arnot Forest maple operation and learn modern sap collecting techniques and quality control in making syrup. A 100-tal area is reserved for student installation of a tubing sap collection network.

**320 Winter Energetics** Spring 1 credit. Prerequisite: Natural Resources 250.

Lec, lab, and disc, all day M T W R F in residence at Arnot Forest. A. N. Moen.

Field measurements of weather and range conditions in the winter will be related to metabolism, nutrition, and behavior of free-ranging animals at the Arnot Forest during the last week of the January intersession period.

**321 Field Ornithology** Summer (fall credit can be arranged). 1 credit. Enrollment limited. Prerequisite: permission of instructor. Recommended: Natural Resources 210 and Biological Sciences 360.

Lec, lab, and disc, all day M T W R F in residence at Arnot Forest. C. Smith.

Emphasis will be placed upon methods of field identification of birds by sight and sound and the use of those skills in the estimation of abundance and analysis of avian community structure. Field exercises will involve students in the collection and evaluation of field data relevant to studies of songbird populations and community structure in a management context. Introductory Field Biology (Natural Resources 210) and General Biology (Biological Sciences 360) are desirable prerequisites. This course should be considered complementary to a one-semester course in ornithology and will not substitute for such a course. The course is held at the Arnot Forest during the three-week summer session beginning the week after Commencement.

**322 Small Mammal Field Biology** Summer or fall. Prerequisite: Natural Resources 250 or permission of instructor.

Lec, lab, and field sessions, all day M T W R F in residence at the Arnot Forest. R. A. Howard. Capture, handling, marking, and field identification techniques for small mammals will be emphasized. Exercises in home range analysis and population estimation with both recapture and removal sampling will supplement natural history discussions. Community structure and habitat interactions will also be stressed. Students will complete an independent survey of small mammals in a limited area of the forest. This course is held during the three-week summer session at the Arnot Forest in early June.

**330 Ecological Integration** Summer or fall. 4 credits. Prerequisite: Natural Resources 250 or permission of instructor.

Lec, lab, and disc, all day M T W R F in residence at Arnot Forest. A. N. Moen.

Measurements and analyses of weather, watershed, plant community, and animal population characteristics in an integrated ecological way, stressing interrelationships within ecosystems. This course will be held at the Arnot Forest during the three-week summer session beginning the week after Commencement.

**360 Earth Resources Inventories (also Agronomy 360)** Spring, 3 credits.

Lecs, M W 12:20; lab, M T 2. E. E. Hardy. Procedures for inventorying resources, the methods used, and theories of inventory development in relation to present needs. Examination of the processes used in generating currently used inventories, application of methods to improve existing inventories, and experience in developing inventories. Land resource inventories are emphasized.

**406 Conducting Marine and Natural Resources Extension Programs** Spring, 3 credits.

Lec and rec. Time and days to be arranged. One weekend field trip. B. T. Wilkins.

Extension educational programs aiding users of marine and natural resources have similarities to, but also significant differences from, more traditional extension programs. This course will provide an overview of approaches to extension programming in these emerging fields and give attendees experience in components important in successfully conducting such efforts.



**407 Religion, Ethics, and the Environment**

Spring. 3 credits. For juniors, seniors, and graduate students; others by permission. S-U grades optional.

T R 9:05, 1-hour disc to be arranged. R. A. Baer.  
A study of the effects of Western religion and values on our understanding and treatment of nature. Historical overview followed by consideration of selected themes, including progress, play and work, the meaning of the term *nature*, human finitude and death, and the nature of ethics as a discipline. Also responsibility to future generations; limiting growth and questions of distributive justice; world population and global hunger; nuclear holocaust and the environment; implications of environmental programs for minorities, the poor, and other nations; land use (including the preservation of farmland); and energy policy.

**410 Principles of Wildlife Management**

Fall. 4 credits. Limited to 36 students. Preference given to seniors in natural resources. Prerequisites: Natural Resources 210 and Biological Sciences 360, or permission of instructor. Cost of field trips, no more than \$20.

Lecs, M W F 10:10; lab, F 1:25–4:25. One 3-day field trip required. T. A. Gavin.

Stresses the application of ecological, behavioral, and genetic principles to management of wild vertebrate populations. Encourages student development of a theoretical-biological framework on which to base management decisions. Provides students with a sense of the history of wildlife management in North America and a feeling for its future.

**411 Techniques in Wildlife Science**

Spring. 2 credits. Prerequisite: Natural Resources 410 or permission of instructor.

Lec, F 12:20; lab, F 1:25–4:25. J. W. Caslick.  
An introduction to techniques used in wildlife research and management, with emphasis on field methods and northeastern game species.

**414 Selected Topics in Wildlife Resource Policy**

Spring. 2 credits. Intended for juniors and seniors. Prerequisite: Natural Resources 410 or equivalent or permission of instructor. S-U grades optional. Cost of field trips, no more than \$25. Offered alternate years.

T 1:25–4:25. Several field trips usually taken weekdays, one overnight field trip to Albany.  
H. B. Brumsted.

A seminar devoted to analysis of selected current policy issues in wildlife management. Particular attention is given to citizen roles in policy development.

**417 Wetland Resources**

Summer. 1 week at Shoals. 1 credit.

R. A. Malecki.  
For description, see listing under "Courses in Marine Science" in the section on the Division of Biological Sciences.

**430 Dynamics of Animal Populations**

Spring. 2 credits. For seniors and graduate students in natural resources; others by permission of instructor. Offered alternate years.

T R 10:10. W. D. Youngs.  
A quantitative examination of the dynamics of animal populations. Interactive computing is used to assist in analysis and understanding of mortality, growth, population estimation, and population interaction.

**438 Fishery Resource Management**

Spring. 3 credits. Prerequisite: Natural Resources 440 or permission of instructor.

Lecs, T R 8. W. D. Youngs.  
Principles and problems in the management of freshwater and marine fishery resources, considered in relation to problems of human population and management of other natural resources.

**440 Fishery Science**

Fall. 3 credits. For 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.

**442 Techniques in Fishery Science**

Fall. 3 credits. Limited to 15 upperclass and graduate fishery students. Cost of field trips, no more than \$30. T R 1:25–4:25; one or more weekend field trips.

D. A. Webster.  
Emphasis is on methods of collecting fish and related data when information on population dynamics is of paramount importance. Laboratories include field experience in use of gear and instruments. Opportunities for additional experience in ongoing college fishery research program is provided.

**443 Managing the Aquatic Environment**

Fall. 2 credits. Limited to 30 juniors and seniors not majoring in aquatic science.

Lecs, T R 9:05. R. T. Oglesby.  
The nature of aquatic environments and effects of humans on them are initial foci. Wise use of aquatic resources is surveyed in terms of human impacts on them, including the introduction of toxicants and nutrients, removal or addition of particular biotic components, and modifications of the physical environment. Emphasis is on lakes, rivers, and estuaries. A case history approach is used.

**490 Practicum in Natural Resources Analysis and Management**

Fall. 5 credits. For seniors in natural resources; others by permission of instructors.

Hours to be arranged. Staff.  
An in-depth exercise in planning the management of selected resources in a defined geographic area. Students work in groups under the supervision of a faculty committee with other faculty members acting as consulting experts. Student groups make oral and written reports on their management plans to a client panel of faculty members and outside evaluators.

**493 (498) Research in Resource Analysis and Planning**

Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional.

R. A. Baer, H. B. Brumsted, E. E. Hardy, T. L. Hullar, J. W. Kelley, R. J. McNeil, B. T. Wilkins.

**494 Research in Fishery Science**

Fall or spring. Credit to be arranged. S-U grades optional.

Hours to be arranged. J. L. Forney, S. P. Gloss, R. T. Oglesby, C. L. Schofield, D. A. Webster, W. D. Youngs.

**495 Research in Wildlife Science**

Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional.

H. B. Brumsted, J. W. Caslick, T. A. Gavin, R. A. Howard, R. A. Malecki, A. N. Moen, M. E. Richmond.

**496 Research in Forestry**

Fall or spring. Credit to be arranged. S-U grades; letter grade by permission of instructor.

Hours to be arranged. T. J. Fahey, J. P. Lassoie, L. H. Weinstein.

**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.

**601 Seminar on Selected Topics in Fishery Biology**

Fall or spring. 1 credit.

Hours to be arranged. Staff.

**602 Seminar in Natural Resources Analysis for Ecologically Based Planning**

Spring. 2 credits. S-U grades only.

M 2:30. T. J. Fahey.  
Multidisciplinary graduate seminar. Theme changes each year but usually involves a case study of a specific area of land and water. Fieldwork usually required. Engineers, economists, sociologists, soil scientists, foresters, planners, and wildlife and fishery biologists are invited to bring expertise to the planning table.

**603 Habitat Ecology**

Spring. 2 or 3 credits. Limited to 12 seniors and graduate students majoring in natural resources or biological sciences.

Prerequisite: permission of instructor. Cost of field trips, no more than \$20.

W 12:20–3. M. E. Richmond.  
This course requires an understanding of broad ecological concepts relative to plant-wildlife interactions. The concepts of niche, habitat, and ecotone are addressed from the standpoint of island biogeographic principles, structural and spatial heterogeneity of the vegetation, community productivity, and temporal change. Major landforms and plant-animal communities of the northeastern United States will be visited during weekend field trips. Paper required for 3-credit option.

**604 Seminar on Selected Topics in Resource Policy and Planning**

Fall. 1 credit. S-U grades only.

Hours to be arranged. Staff.  
Primarily for graduate students majoring or minoring in natural resources conservation.

**605 Ecology and Management of Disturbed Aquatic Systems (also Toxicology 605)**

Spring. 3 credits. Limited to 20 seniors and graduate students. Recommended for students specializing in the aquatic sciences. Prerequisite: limnology or oceanography. Offered alternate years.

Lec, T 9:05; disc, T 1:25–3:25; at least 1 S field exercise. R. T. Oglesby.

Lectures and readings focus on responses of aquatic ecosystems to stress and on significance of such reactions. Methods and strategies of management to minimize undesirable aspects of human activities are considered. Detailed case histories are studied and discussed.

**606 Marine Resources Policies**

Spring. 2 credits. Prerequisite: at least one related course such as Biological Sciences 364, 666, or 668; Natural Resources 438; or permission of instructor. S-U grades optional. Offered alternate years.

R 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 regulations, marine mammal protection, and wetland preservation.

**608 Policies and Management of Natural and Wild Lands**

Fall. 2 or 3 credits (required field trip for 3-credit option). Prerequisite: permission of instructor. S-U grades optional.

Lec, T 9–11. T. L. Hullar.  
Lectures, discussions, special seminars, readings, and case studies on natural and wild lands, particularly those in public ownership. Major topics include the values of these lands, social and scientific basis for their establishment, analysis of the policies for preservation and use, and methods and strategies for management. National and state wilderness systems, social and biological carrying capacity, effects of special interests, and current issues are covered. An independent study of a selected area is required.

**609 Effects of Ecological Perturbations on Fishes (also Toxicology 609)**

Spring. 3 credits. Prerequisite: Biological Sciences 476 or permission of instructor. Cost of field trips, no more than \$15.

Lecs, T R 9:05; lab, W 1:25–4:25; several field trips. S. P. Gloss.

Impacts of habitat alteration and physical-chemical pollutants, with emphasis on freshwater and diadromous fish species of North America. Direct and indirect effects of a variety of industrial and land-use practices on fish and other aquatic organisms with resultant changes in structure and function of fish communities due to lethal and sublethal responses are discussed. Laboratory includes several field trips.

**610 Conservation Seminar** Fall and spring. No credit. All graduate students in natural resources are expected to participate.  
Hours to be arranged. Staff.

**611 Seminar in Environmental Ethics** Spring. 3 credits. For graduate students, juniors, and seniors. S-U grades optional. Cost of weekend trip, no more than \$15.

W 1:25–3:50; two or three extra class sessions for presentations of papers and projects. Weekend trip to be arranged. R. A. Baer.

How the humanities, particularly religion, philosophy, and ethics, contribute to our understanding of the environment. In successive years, topics will include (1) land use ethics, (2) the ethics of farmland preservation, (3) the ethics of toxic wastes disposal, and (4) concepts of growth and progress in Western culture and their impact on our treatment of the environment.

**612 Wildlife Science Seminar** Fall and spring. 1 credit. Prerequisite: permission of instructor. S-U grades optional.

Hours to be arranged. Staff.  
Discussion of individual research or current problems in wildlife science.

**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.

**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.

#### Biology of Fishes (Biological Sciences 476)

#### Agricultural Economics 350, 450

#### Image Analysis (Aerial Photo Interpretation) (Civil and Environmental Engineering 613)

#### Insect Biology (Entomology 212)

#### Limnology (Biological Sciences 462)

#### Mammalogy (Biological Sciences 471)

#### Oceanography (Biological Sciences 461)

#### Ornithology (Biological Sciences 475)

#### Phycology (Biological Sciences 348)

#### The Vertebrates (Biological Sciences 274)

## Plant Breeding and Biometry

W. D. Pardee, chairman; R. E. Anderson, P. Y. Bouthyette, W. R. Coffman, E. D. Earle, H. L. Everett, V. E. Gracen, Jr., P. Gregory, C. C. Lowe, H. M. Munger, R. P. Murphy, M. A. Mutschler, O. H. Pearson, R. L. Plaisted, R. R. Seane, M. E. Sorrells, D. R. Viands, D. H. Wallace

Biometry courses are listed under "Statistics and Biometry."

**225 Plant Genetics** Spring. 4 credits. Prerequisite: one year introductory biology or permission of instructor. Limited to 50 students.

Lecs, M W F 9:05; lab, W or R 1:25; lab section assignments at first lecture. Labs start first week. M. A. Mutschler.

An overview of genetic principles is related to plant sciences. Mendelian inheritance and cell mechanics, DNA as genetic material, genetic line structure and gene regulation, gene recombination, linkage and mapping, gene interaction, extranuclear inheritance, environmental effect on phenotypic expression, gene mutation and chromosomal aberrations, variation in chromosome numbers, genes in populations, multiple gene inheritance, tissue culture, and genetic engineering. Students conduct an independent inheritance project with *Brassica campestris*.

**401 Plant Cell and Tissue Culture** Spring. 2 credits. Prerequisite: a course in plant physiology, 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 another culture and the applications of these techniques to biological and agricultural studies. Current and proposed methods for plant improvement via manipulations of cultured cells will be discussed.

**603 Methods of Plant Breeding** Fall. 4 credits. Primarily for graduate students but open to qualified seniors who expect to engage in plant breeding.

Prerequisites: Biological Sciences 101–102, Biological Sciences 281 or Plant Breeding 225, or equivalent; and field crops, vegetable crops, floriculture, or pomology. Students must enroll in this course by August 1.

Lecs, T R 8; labs, T R 1:25–4:15 (labs till 5 during first month). 2 S field trips. R. E. Anderson, H. L. Everett, W. R. Coffman.

Breeding systems for producing commercial crop varieties are considered in detail. Laboratories include selection techniques, screening for heritable variation, and controlling pollination. Special emphasis is on selection for disease resistance and improved nutritional quality and on use of exotic germ plasm.

**605 Physiological Genetics of Crop Plants** Spring. 3 credits. Prerequisites: either genetics, biochemistry, and plant physiology, or permission of instructor.

T R 8–10. D. H. Wallace.  
Both genetic and environmental influences on biochemical and molecular control of plant variation in physiological phenomena like photosynthesis, respiration, translocation, self-incompatibility, male sterility, maturity, yield, and heterosis are discussed. Emphasis is on variation that can be exploited in plant breeding, particularly in breeding for higher yield and adaptability.

**608 Biochemical Analyses in Crop Science** Fall. 3 credits. Limited enrollment. Prerequisite: Biochemistry 330 or permission of instructor. S-U grades optional. Students must enroll in this course by Aug. 27.

Lab, lec, M W 1:25–5 (some lab sessions will run longer). P. Y. Bouthyette, P. Gregory.  
Acquaints the student with specialized biochemical analyses commonly used in breeding programs and related aspects of crop science. Nutrients and toxicants of several crops are studied. Importance of developing an ability to critically assess the biochemical analysis is emphasized.

**612 Experimental Methods** Spring. 2 credits. Prerequisite: Plant Breeding 601 or permission of instructor. Offered alternate years.

M W F 12:20. C. C. Lowe.  
The use of statistical methods and the application of experimental designs and plot techniques to problems in plant breeding and related agricultural research.

**622 Seminar** Fall or spring. 1 credit. S-U grades only.

T 12:20. Staff and graduate students.

**629 Special Topics in Plant Science Extension** Spring. 2 credits.

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.

**650 Special Problems in Research and Teaching**

Fall, spring, or summer. 1 or more credits by arrangement with instructor. Undergraduates must attach to their course enrollment material written permission of the staff member who will supervise the work and assign the grade.  
Staff.

**716 Perspectives in Plant Breeding Strategies** Spring. 2 credits. S-U grades optional. Prerequisite: Plant Breeding 603.

R 12:20–2:15. M. E. Sorrells.  
Selection techniques and breeding objectives, methods, and strategies for both self- and cross-pollinated crops are reviewed and discussed. Extensive outside reading is required. Emphasis is on discussion and evaluation of selected benchmark papers and current literature.

**717 Quantitative Aspects and Related Issues of Plant Breeding** Spring. 3 credits. Prerequisites: Plant Breeding 603 and Statistics 601. S-U grades only.

M W F 9:05. R. L. Plaisted, D. R. Viands.  
Discussion of random-mating populations, inbreeding, components of variance, gene-pool development, and other issues pertaining to breeding of cross-pollinated crops.

**718 Genetics and Breeding for Disease and Insect Resistance** Fall, first 7 weeks of semester. 1 credit. Prerequisite: Plant Breeding 603. S-U grades only.

T R 10:10. V. E. Gracen.  
Discussions of genetics and mechanisms of insect and disease resistance as they relate to the development and utilization of pest-resistant varieties.

## Plant Pathology

W. E. Fry, chairman; J. R. Aist, P. A. Arneson, S. V. Beer, G. C. Bergstrom, B. B. Brodie, R. S. Dickey, M. B. Harrison, R. K. Horst, G. W. Hudler, H. W. Israel, E. D. Jones, R. P. Korf, J. W. Lorbeer, R. Loria, W. F. Mai, R. L. Millar, W. F. Rochow, W. A. Sinclair, R. W. Smiley, H. D. Thurston, H. D. VanEtten, R. E. Wilkinson, O. C. Yoder, M. Zaitlin, T. A. Zitter

**301 Introductory Plant Pathology** Fall. 4 credits. Prerequisites: Biological Sciences 101–102 and 103–104 or 105–106. Recommended: Biological Sciences 241 or equivalent.

Lecs, T R 11:15; lab, M T W R or F 2–4:25 plus one period weekly, scheduled at the convenience of the student. W. A. Sinclair.

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; chemical and biological control.

**309 Introductory Mycology** Fall 4 credits.  
Prerequisites: a year of botany or equivalent and permission of instructor.

Lecs, T R 10:10–11:05; labs, T R 1:25–4:25.  
Required field trips. R. P. Korf.

An introduction to fungi, emphasizing comparative morphology and biology.

**402 Plant Disease Control** Spring. 3 credits.  
Prerequisite: Plant Pathology 301 or equivalent.

Lecs, T R 11:15; lab and rec, T W or R 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, building on the students' knowledge of diseases and their causal agents. General principles and concepts, illustrated by specific examples, are presented. Students write a term paper applying these principles to a specific disease-control problem. The laboratories provide practical experience in diagnosis and disease-control techniques.

**443 Pathology and Entomology of Trees and Shrubs (also Entomology 443)** Fall. 5 credits.

Prerequisites: either Plant Pathology 301 and Entomology 241 or equivalent.

Lecs, M W F 10:10; labs, T R 1:25–4:25 or W F 1:25–4:25. Evening prelims. W. T. Johnson, 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 and anthropod pests of trees and shrubs. Forest, shade, and ornamental plants are considered.

**444 Integrated Pest Management (also Entomology 444)** Fall. 4 credits.

For description see Entomology 444.

**497 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 in mycology or plant pathology under the direction of a faculty member.

**498 Teaching Experience** Fall or spring. 1–5 credits. 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.

**499 Undergraduate Research** Fall or spring. 3–5 credits. S-U grades optional.

Hours to be arranged. Staff.

An opportunity for research experience under the direction of a faculty member.

#### 641–655 Special Topics Series

*Unless otherwise indicated, the following description applies to courses 641–655.*

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.

#### 641 Cytology of Plant Diseases

J. R. Aist, H. W. Israel.

#### 642 Plant Disease Epidemiology

P. A. Arneson, W. E. Fry.

#### 644 Soil-Borne Pathogens

R. W. Smiley, G. S. Abawi.

#### 645 Plant Virology

M. Zaitlin, W. F. Rochow.

#### 646 Plant Nematology

M. B. Harrison, W. F. Mai, B. B. Brodie.

#### 647 Bacterial Plant Diseases

R. S. Dickey, S. V. Beer.

#### 648 Pathogen and Disease Physiology

H. D. VanEtten.

#### 649 Mycology Conferences

Fall.  
R. P. Korf.

Ascomycetes (excluding Discomycetes).

#### 650 Diseases of Vegetable Crops

Fall.  
J. W. Lorbeer, P. A. Arneson, R. E. Wilkinson, T. A. Zitter.

#### 651 Diseases of Fruit Crops

Aututorial slide and tape sets. P. A. Arneson.  
For graduate students and advanced undergraduates with a particular interest in fruit. Covers the economic importance, causal agents, symptoms, disease cycle, and control measures for the major diseases of fruit in the Northeast.

#### 653 Dendropathology

G. W. Hudler, W. A. Sinclair.

#### 654 Diseases of Florist Crops

R. K. Horst.

#### 655 Plant Diseases in Tropical Agricultural Development

Spring.  
H. D. Thurston.

#### 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.

#### 701 Advanced Plant Pathology

Spring. 4 credits.  
For graduate students with a major or minor in plant pathology; others by permission. Prerequisites: Plant Pathology 301 and 309 or equivalent, and permission of instructor.

Lecs, T R 11:15; lab, T 2–4:25; disc, R 2–4:25.  
R. L. Millar.

Conceptual basis of plant pathology in terms of the nature of disease, etiology, stages in pathogenesis, epidemiology, and pest management. Laboratories involve exercises illustrating concepts; discussions integrate lectures and laboratory topics.

#### 711 Biology of Plant Pathogens

Fall. 4 credits.  
Limited to graduate students with a major or minor in plant pathology. Prerequisite: Plant Pathology 701 or equivalent with permission of instructor.

Lec, T R 11:15; lab, T R 1:25–4:25. S. V. Beer and staff.

Provides instruction and practice in the diagnosis of plant disease and the biology of plant pathogens. All important classes of plant pathogenic agents are considered. Classical and modern techniques are discussed.

#### 735 Advanced Plant Virology

Spring. 3 credits.  
Prerequisite: permission of instructor. Not offered 1984–85.

Lecs (2); lab (1). M. Zaitlin.

Topics in plant virology, with an emphasis on student participation in discussion of current literature. Topics included are virus structure, viral and viroid replication, DNA plant viruses and their potentials for plant transformation, mechanisms of vector transmission, mechanisms of pathogenesis, and control measures for plant viruses. Laboratory topics will be adjusted to accommodate the needs and interests of the participants but could include molecular hybridization, serology, electrophoresis, protoplast; and tissue culture applications.

#### 736 Plant Nematology

Spring. 3 credits. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: permission of instructor.

Lec, T R 9:05; lab, T 1:25–4:25. W. F. Mai, M. B. Harrison

Anatomy, morphology, and taxonomy of plant parasitic forms and nonparasitic soil-inhibiting forms

of nematodes are studied. Plant pathogenic forms are also considered from the standpoint of host-pathogen relationships, host ranges, life cycles, and the symptoms they cause. Principles and methods of control are discussed.

#### [737 Bacterial Plant Pathogens

Spring. 3 credits  
For graduate students with a major or minor in plant pathology. Prerequisites: Plant Pathology 701 and 711 or permission of instructor. Offered alternate years. Not offered 1983–84.

Lecs, T R 9:05; lab, W or F 1:25–4:25. R. S. Dickey.  
Basic information on bacterial plant diseases and phytopathogenic bacteria. The laboratory includes some of the more important techniques used in the study of bacterial plant pathogens.]

#### 738 Molecular Mechanisms of Pathogenesis

Fall. 2 credits. For graduate students with a major in plant pathology or special interest in molecular mechanisms of pathogenesis. Prerequisite: permission of instructor. Offered alternate years.

Hours to be arranged. H. D. VanEtten, O. C. Yoder, and staff.

This course deals with the molecular properties of both microorganisms and higher plants that control the development of host-parasite relationships. Contemporary molecular hypotheses are related to genetic mechanisms of pathogenesis. Emphasis is placed on a critical evaluation of the data that are used to support each specific hypothesis.

#### [739 Advanced Mycology

Fall. 4 credits  
Prerequisites: Plant Pathology 309 or equivalent, a course in genetics, and permission of instructor. Offered alternate years. Not offered 1983–84 nor 1984–85.

Lec, M 10:10; labs, M W 1:25–4:25, plus an additional 3-hour period to be arranged. Optional field trips. R. P. Korf.

A detailed study of the taxonomy and biology of the major groups of plant pathogenic fungi (rusts, smuts, fungi imperfecti, Peronosporales).]

#### 756 Advanced Plant Nematology

Fall. 3 credits  
For graduate students with a major in plant pathology and special interest in nematology. Prerequisite: permission of instructor. Offered alternate years.

Hours to be arranged. W. F. Mai, M. B. Harrison, B. B. Brodie.

#### [759 Taxonomy of Fungi

Fall. 4 credits.  
Prerequisites: Plant Pathology 309 or equivalent, genetics, plant or animal taxonomy, and permission of instructor. Offered alternate years. Not offered 1983–84.

Lec, M 10:10; labs, M W 1:25–4:25; required field trips. R. P. Korf.

Emphasis is on the principles of taxonomy, critical evaluation of keys and monographs, and practice in identification. The Discomycetes are treated in detail.]

#### 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.

#### 799 Graduate Research

Fall or spring. 1–5 credits. S-U grades optional.

Hours to be arranged. Staff.

## Pomology

G. H. Oberly, chairman; G. D. Blanpied, L. L. Creasy, J. N. Cummins, F. W. Liu, R. M. Pool, L. E. Powell, W. C. Stiles, J. P. Tomkins, R. D. Way

#### 100 Introductory Pomology

Fall or spring.  
3 credits. S-U grades only for graduate students.

Fall: lec, T R 8; lab, M or W 2–4:25. Spring: lec, T R 8; lab, T or W 2–4:25. One half-day field trip required. G. H. Oberly.

A study of the general principles and practices of fruit culture and their relation to the underlying sciences. Included are tree fruits, grapes, small fruits, and nuts. Topics covered include propagation, varieties, crop management, and growth and fruiting habits. Practical work is presented in grafting, pruning, site and soil selection, and planting.

**208 Economic Fruits of the World** Spring. 3 credits. Prerequisite: introductory biology or permission of instructor. Offered alternate years.

Lecs, M W 10:10; lab, F 2-4:25. F. W. Liu.  
The more important subtropical and tropical fruits such as citrus, banana, pineapple, mango, coffee, and cacao are considered. Morphology, physiology, and adaptation to climate are stressed rather than details of culture. A broad view of world pomology is given.

**302 Fruit-Tree Nursery Operation** Spring, first 4½ weeks. 1 credit. Prerequisite: Pomology 100 or permission of instructor. S-U grades optional. Offered alternate years.

Lecs, M W 9:05; lab, M 2-4:25. J. N. Cummins.  
This course is intended to familiarize the fruit producer with the operations and problems of the fruit-tree nursery operator. Topics include production objectives, management decisions, and cultural aspects of nursery operation. Techniques of grafting, budding, pest identification, inspection, and grading of fruit-tree planting stocks are included.

**304 Orchard Management I** Spring. 3 credits. Prerequisite: Pomology 100.

Lecs, M W 8; lab, R 1:25-4:25. L. E. Powell, W. C. Stiles.  
A treatment of problems of concern to fruit growers such as site selection, planting and pruning systems, water relations, cold hardiness, dormancy, flowering, and fruiting. Physiological and practical aspects are emphasized.

**305 Orchard Management II** Fall. 3 credits. Prerequisite: Pomology 100. Recommended: Pomology 304.

Lecs, M W 8; lab, R 1:25-4:25. G. H. Oberly, L. L. Creasy.  
A continuation of the principles of pomology presented in Pomology 304. Subjects include the later stages of fruit maturation, quality, harvesting, aspects of tree nutrition, protection from pests, and regulatory policies affecting fruit production and sale.

**306 Small Fruits** Spring, last 9 weeks. 2 credits. Prerequisite: Pomology 100 or permission of instructor. Offered alternate years.

Lecs, M W 9:05; lab, M 2-4:25. J. P. Tomkins.  
A study of the general principles and practices in the commercial culture of strawberries, brambles, blueberries, currants, gooseberries, elderberries, and cranberries.

**307 Viticulture** Fall. 3 credits. Prerequisite: Pomology 100 or permission of instructor. Offered alternate years.

Lecs, T R 9:05; lab, T 2-4:25. R. M. Pool.  
Viticulture, with emphasis on the viticulture of the Great Lakes region, as a series of interrelated decisions on varieties, sites, vine management, and vine protection, is presented. Those decisions are based on ampelography, meteorology, soils, vine and grape anatomy and physiology, as well as protection of the vine and grapes from injuries, primarily diseases and insects.

**310 Postharvest Physiology and Storage of Fruits and Vegetables** Fall. 3 credits. Prerequisite: a course in pomology or vegetable crops, or permission of instructor.

Lecs, M W 9:05; lab, F 2-4:25. One field trip is required. F. W. Liu.  
The chemistry and physiology of fruits and vegetables as they affect quality and marketability are studied. Maturity indices, handling methods, and

storage practices are considered. Practical work includes observations of the effect of handling and storage methods on quality and condition of fruits and vegetables.

**311 Fruit Crop Systematics** Fall, first 4½ weeks. 1 credit. Prerequisite: Pomology 100 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1983-84; next offered 1984-85.

Lecs, T R 9:05; lab, T 2-4:25. G. H. Oberly.  
The classification of fruit species is considered from a botanical and production viewpoint. The course deals with the identification and naming of fruit species and varieties and their botanical classification.]

**313 Utilization of Fruit Crops** Fall, middle 4½ weeks. 1 credit. Prerequisite: Pomology 100 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1983-84; next offered 1984-85.

Lecs, T R 9:05; lab, T 1:25-4:25. F. W. Liu.  
A consideration of the fate after processing of fruits produced for consumption. The coverage of fruit products is generally limited to those commercially grown and processed in New York State. Although the discussion includes methods of canning, freezing, dehydration, and other types of processing, emphasis is on the quality requirement and proper handling of raw materials and how they affect the quality of end products.]

**315 Fruit Variety Improvement** Fall, last 4½ weeks. 1 credit. Prerequisite: Pomology 100 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1983-84; next offered 1984-85.

Lecs, T R 9:05; lab, T 2-4:25. R. D. Way.  
The techniques and limitations of producing new varieties of perennial fruit crops are considered.]

**400 Undergraduate Seminar** Spring. 1 credit (may be taken twice for credit). Prerequisite: a course in pomology. S-U grades only.

Hours to be arranged. Staff.  
Seminar topics and speakers selected and arranged by the students on subject areas related to pomology.

**402 Special Topics in Experimental Pomology** Spring. 3 credits. Open to undergraduates by permission. Offered alternate years.

Hours to be arranged. Staff.  
Selected topics are considered with respect to the current literature or experimental techniques. Topics reflect the research interests of the professors who participate.

**604 Growth and Development of Woody Plants** Spring. 2 credits. Prerequisite: introductory plant physiology. Offered alternate years.

T R 9:05. L. E. Powell.  
An advanced course dealing with physiological, morphological, and biochemical changes during development, beginning with the seed and advancing through the mature reproductive plant. Hormonal control mechanisms emphasized.

**610 Research** Fall or spring. 2 or more credits. Prerequisite: a course in advanced pomology. S-U grades optional. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work and assign the grade.

Staff.

**700 Graduate Seminar** Fall. 1 credit. S-U grades only.

Hours to be arranged. Staff.  
Reports by students on current research or literature in experimental pomology or related areas.

**710 Teaching Experience** Fall or spring. 1 credit. S-U grades only. Prerequisite: permission of instructor.

Hours to be arranged. Staff.

Designed to acquaint pomology graduate students with the methods and materials involved in teaching. The student participates in the design, delivery, and evaluation of segments of a departmental course.

## Related Course in Another Department

### General Horticulture (Vegetable Crops 103)

## Poultry and Avian Sciences

R. C. Baker, chairman; R. E. Austic, S. E. Bloom, G. F. Combs, Jr., D. L. Cunningham, R. R. Dietert, K. Keshavarz, H. G. Ketola, C. C. McCormick, J. A. Marsh, J. M. Regenstein, G. L. Rumsey, E. A. Schano, A. van Tienhoven

The faculty in the Department of Poultry and Avian Sciences are responsible for courses taught in several areas, including animal sciences, biological sciences, food science, and nutritional sciences. See the particular sections on those subjects for courses.

## Rural Sociology

E. C. Erickson, chairman, M. L. Barnett, F. H. Buttel, H. R. Capener, E. W. Coward, Jr., G. J. Cummings, P. R. Eberts, E. C. Erickson, J. D. Francis, P. Garrett, C. C. Geisler, J. C. Preston, B. M. Scott, F. W. Young

**100 Introduction to Sociology** Fall. 3 credits.

Lecs, T R 10:10; disc, M or F 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. C. C. Geisler and staff.  
An examination of the theories, concepts, and methods of sociology as they apply to sociology in general. Major topics include the origins of the discipline, its major theoretical and methodological currents, and its application to contemporary questions of power and bureaucracy, social and cultural change, materialism and sociobiology, social class, and community institutions. R Soc 100 is formally equivalent to 101 (offered in the spring), though less emphasis is placed on rural society and its problems.

**101 Introduction to Rural Society in America** Spring. 3 credits.

Lecs, T R 10:10; disc, M or F 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. H. R. Capener and staff.  
An organizing theme will be the interactive relationships between the bio-ecological system basic to the natural and physical sciences and the social system basic to the social sciences. From sociological and historical perspectives this survey course will study the structure and functioning of rural society in America from its unique settlement patterns to the present. Alternative strategies for monitoring and mediating major changes of an environmental, community, or technological nature will be explored.

**104 Proseminar: Issues and Problems in Rural Society** Fall. 1 credit. S-U grades only.

R 12:20-1:25. Staff.  
Introduces the student to subject matter of concern to both applied and academic rural sociologists. Focuses on such subjects as migrant workers, agribusiness, rural poverty, rural to urban migration, rural development, agricultural research and people, community development, small farmers in the less-developed nations. These topics are explored through the use of films and group discussion.

**105 Rural Sociology and World Development Problems** Spring. 3 credits.

M W F 10:10. E. W. Coward, Jr.  
An introduction to the analysis of some pressing social problems of contemporary Third World countries. Lectures and reading materials will present different approaches, analyses, and

recommendations that follow from competing theories, in order that the student may determine which approach best explains the situation in Third World countries. Topics to be considered include visions of "development"; the social organization of peasant communities and large-scale agricultural enterprises; problems of land tenure and agrarian reform; the relationships among population growth, hunger, and employment; multinational corporations; social movements and social control.

**175 Issues in Contemporary Native American Societies (also Anthropology 175)** Spring; summer, 6-week session. 3 credits.

Spring: M W F 11:15. R. Fournier.  
Native American 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 a Native American point of view. Early history and the postcontact period will be reviewed with an emphasis given to recent developments (1923–present). 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.

**[213 Social Indicators and Data Management in Poor Countries** Spring. 3 credits. Not offered 1983–84.

M W F 11:15. F. W. Young.  
A survey of definitions and measures of welfare and social structure. General principles of social-indicator research will be illustrated from data on Tunisia, Kenya, Mexico, etc., in the areas of poverty and level of living, inequality, agricultural productivity, environmental problems, and status restrictions on minorities and women. The course will cover measures based on census data, informant surveys, and household surveys, with an emphasis on simple and low-cost techniques. One-third of the course will be devoted to exercises in data management, using SPSS and microcomputers.]

**242 American Indian Philosophies I (also Anthropology 242)** Fall. 3 credits.

T R 2:30–3:45. S. Saraydar.  
This course is designed to facilitate an understanding of the world views of American Indians of the past and present. The philosophies of contemporary figures such as Deloria, Momaday, and the enigmatic don Juan are evaluated along with those of Black Elk, Hansome Lake, and other Indians of earlier times. 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.

**299 Woman and Development in the Third World: A Sociological Approach (also Sociology 299 and Women's Studies 299)** Summer, 6-week session. 3 credits.

M T W R F 11:30–12:45. E. G. Polakoff.  
This course will examine the impact of development and modernization on the status and roles of women in the Third World. Theories of development and sexual stratification and assumptions guiding research and development planning will be discussed and evaluated. Students will gain an understanding of the nature and significance of female activities and the extent of female authority within the context of social class, history, and prevailing cultural, religious, and political ideologies. Although the course will focus on Latin America, there will be opportunities for cross-regional comparisons.

**324 Social Organization and the Environment** Spring. 3 credits.

M W F 9:05. Staff.  
A discussion of principles involved in our interaction with our physical environment, viewed from a human ecological and ecosystem perspective. Emphasis is given to the function of social organization in

human-environment exchanges. Principles are illustrated by referring to both developing and developed societies. The course provides a conceptual framework for understanding and addressing recurring environmental issues.

**355 Rural Development and Cultural Change** Fall. 3 credits.

Lecs, T R 10:10; disc, T or R 11:15. M. L. Barnett.  
An analysis of planned social-change programs in predominantly agricultural societies. Focusing on problems of administration, socioeconomic development, and the introduction of new practices.

**356 Rural Society in America** Fall 3 credits S-U grades optional.

M W F 9:05. H. Capener.  
The focus is on gaining a greater understanding of, and appreciation for, the rural sector of American society. From sociological and historical perspectives, the nature of changes in rural society are examined, including the impact of technology on agriculture, other extractive industries, natural resources, the environment, regional variation, the rural-urban dominance theme, comparative life-styles, cultural orientations, value patterns, and a look to the future.

**357 Subsistence Agriculture in Transition** Spring. 3 credits.

Lecs, T R 10:10; disc, T or R 11:15. M. L. Barnett.  
An analysis of selected types of peasant communities, drawn from differing ecological conditions. Social structure, systems of farming and land-tenure arrangements, and motivational characteristics of subsistence farmers in the context of socioeconomic change. Theoretical and policy aspects of modernization and traditional agriculture, and programming for agricultural development.

**360 The Older Order Amish: Folk Society or Model for the Future?** Summer, 3-week session. 3 credits.

M T W R F 9–11:30. M. Olshan.  
The relevance of Amish practices and attitudes to such issues as ecological deterioration, appropriate technology, and governmental influence. Examination of the paradox of Amish freedom from American institutions in what is a highly regimented subculture. The significance of recent court decisions that both legitimize and challenge Amish separation from United States society.

**367 American Indian Tribal Governments (also Anthropology 367)** Fall 3 credits.

W 7:30–9:55 p.m. S. Saraydar.  
This course focuses on the structure of contemporary tribal governments and the ways in which these 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.

**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 P. Garrett, departmental honors committee representative.

**401 Intermediate Sociological Theory (also Sociology 401)** Fall. 4 credits. S-U grades optional.

T R 10:10–12:05. P. Eberts.  
An advanced undergraduate seminar for senior majors in rural sociology and sociology. The course focuses on (1) the central concepts of the sociological tradition; (2) major classical theorists (Marx, Weber, Durkheim, Tocqueville) and contemporary counterparts; (3) application of the classical ideas in contemporary research.

**410 Leadership and Authority in Group Relations: The Tavistock Approach** Spring 2 credits. Limited to 18 (juniors, seniors, and graduate students). Prior experience with groups is preferred.

T R 2:30–4:25. H. Kramer.  
Examination of group relations, leadership, and exercise of authority. Study of what happens in and among groups as it occurs. Special attention is paid to covert processes that influence groups. Students apply their learning to future professional interactions with client, community-development, task, or other work groups

**432 Community Development** Fall. 3 credits

T R 10:10–11:30. J. C. Preston.  
Examines the major concepts, trends, and issues in community development from the perspective of the community-development change agent. Areas examined include community, community change, community action, community conflict, community leadership, citizen involvement, and strategies and tactics for planned community change.

**436 Small Towns** Spring. 2 or 3 credits.

Prerequisite: Rural Sociology 100, 101, or 105.  
M W F 11:15. P. Eberts.  
The rural population turnaround has caused a resurgence in small town attractiveness. This course examines this historic shift in terms of the spread of high-technology industry, the transformation of small town economics, politics, human services, education, communication, and the future of quality of life in nonmetropolitan America.

**437 Environment and Aging (also Sociology 347)** Summer, 3-week session. 3 credits.

M T W R F 9:15–11:45. P. Taietz.  
An analysis of the impact of social policies on the older person's freedom and independence. Older persons and their interactions with their environments are studied under the topics of community, neighborhood, the domicile, planned housing, and institutions. Attention is given to the formal and informal networks of services that help to maintain independent living arrangements by the elderly. Rural-urban differences in service availability and accessibility are considered.

**[440 The Social Impact of Rapid Resource Development** Fall. 3 credits. Not offered 1983–84.

T 7–10. C. Geisler.  
The seminar defines social-impact, assessment (SIA), and identifies alternative models of doing social-impact assessment and the experience various rural minorities have had with SIA, especially American Indians. Students will learn certain practical research skills needed in doing SIA and will participate in an SIA simulation in rural New York.]

**445 Rural Social Stratification** Spring. 3 credits. Letter grades only.

M W F 10:10. P. Garrett.  
Principal issues to be considered in the course include theories of rural stratification in primarily agricultural and advanced industrial societies; social organization of agricultural enterprises; interrelationships among market and nonmarket, agricultural and nonagricultural activities; theories of change in stratification. Appropriate for majors in development sociology and international agriculture.

**462 Health and Social-Economic Development** Spring. 3 credits.

T R 2:30. G. J. Cummings.  
An overview of health services is provided within the larger context of national social and economic development policies. Social-cultural, economic, and managerial factors are stressed as a basis for formulating realistic health planning and service implementation strategies. The allocation of resources to health and human service programs is examined against the backdrop of declining rates of economic growth. Conventional approaches to health services planning in industrial countries are evaluated in terms of their suitability for developing nations.



**463 Industrialization as an Instrument for the Development of Rural Areas** Summer, 6-week session, 3 credits.

T W R 2:30–4:30. R. Bar-El.

Analyses the possible role of industrialization in the development of rural areas. The basic elements of industrial planning described in terms of plant size, technology, labor skills, geographical concentration or dispersion, relations with agricultural activities. An analysis of the different elements of industrial development would be in view of both the existing constraints in most rural areas and small cities (in terms of infrastructure, services, educational level of the population, attitudes) and the development targets (such as employment generation, increase of standard of living, diminution of internal migration).

**464 Rural Planning Issues (also City and Regional Planning 719)** Summer, 3-week session, 3 credits.

M T W R F 9:30–12. C. Geisler, M. Lapping. A synthesis of, and introduction to, theories, issues, and problems of integrated rural planning in the North American context. Addresses the rural/small-town sector in North America, the emergence of dependency, land and tenure, the means of production in rural economies, the changing structure of agriculture and implications for rural planning, single-resource communities and socioeconomic vulnerabilities (forestry, fisheries, tourism, and mining), local economic development, energy development and strategies, the rural elderly, and rural planning as a progressive posture.

**497 Informal Study** Fall or spring, 1–3 credits (may be repeated for credit). 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.  
Informal study may include a reading course, research experience, or public service experience.

**[606 Contemporary Sociological Theories of Development** Fall, 3 credits. Not offered 1983–84.

M W F 11:15. F. W. Young.  
A review of theory, empirical studies, and policy prescriptions as applied to communities and regions, especially those in less-developed countries. Human ecology, the Weberian tradition, central place, dependency/political economy, and symbolic structural theory are compared.]

**[618 Research Design I** Fall, 4 credits. Prerequisite: one course in statistics. Not offered 1983–84.

M W F 10:10; lab to be arranged. J. D. Francis.  
First of a two-semester sequence (may be taken individually) in graduate methods. This course discusses problems of measurement, the design of measuring instruments, and problems of reliability and validity. Some common forms of measuring instruments are discussed, including multidimensional techniques. Students are expected to use actual data for labs.]

**[619 Research Design II** Spring, 4 credits. Prerequisite: an introductory methods course or a statistics course. Not offered 1983–84.

M W F 10:10; lab to be arranged. J. D. Francis.  
The second part of the sequence in graduate methods deals with principles of design, especially nonexperimental designs. An intermediate-level treatment of the following topics: regression and analysis, analysis of variance, analysis of covariance, and causal models. Also discussed are sampling frames, some pragmatic sampling techniques, and some discussion of statistical analysis procedures appropriate under each. Students are expected to use actual data to familiarize themselves with data handling and processing.]

**[621 Environmental Sociology** Spring, 3 credits. Not offered 1983–84.

W 1:25–4:25. F. H. Buttel.  
An exploration of various sociological approaches to the study of society and its physical environment and an analysis of major issues relating to the survival base of human societies—particularly overpopulation, the energy and food crises, the limits-to-growth debate, and the conduct of political struggles over energy and environmental policy.]

**[641 Political Economy of Rural and Regional Development** Spring, 3 credits. Limited to upperclass or graduate students. S-U grades optional. Not offered 1983–84.

T R 10:10–11:25. P. R. Eberts.  
A survey of social, political, and economic factors in regional development. Theories and case studies from demography, human ecology, social organization, and planning are used to examine the emergence or retardation of regions and their implications for contemporary developing and developed societies.]

**[642 Regional Systems and Policy Analysis** Spring, 3 credits. Prerequisites: a social or economic theory course and statistics, or permission of the instructor. S-U grades optional. Not offered 1983–84.

Lec, F 2:20–4:30; disc to be arranged. P. R. Eberts.  
A systems analysis of theoretical and research problems arising from localities' changing social organization. Major theories are examined with attention to their compatibility with modern policy analytic techniques. Topics covered center on the interplay of economic, social class, and political activities in localities.]

**650 Social Organization of Agriculture** Fall, 3 credits.

R 1:25–4:25. E. C. Erickson.  
Concentrates on a small number of significant commercial crops, examining the institutions and relationships involved in the production process: research, credit, distribution of inputs, the farm operation, processing, transportation, and marketing. Patterns at the farm and community level, including topics such as settlement, land tenure, ethnic groups, class structures, methods of cooperation, small farmers, labor problems, and information networks. Ecological and physical constraints on production. Emphasis on the influence of national and international structures—political, social, and economic—on the production process, including the role of government and quasi-government units. Examines the historical circumstances giving rise to the present crop systems. Consideration of what rearrangements of the political, social, and economic structures, both domestic and international, are required for change in crop systems, improvement in production, and increased social welfare.

**[651 Structural Change in United States Agriculture** Fall, 3 credits. Not offered 1983–84.

T 1:25–4:25. F. H. Buttel.  
An analysis of the structural transformations of United States agriculture in the nineteenth and twentieth centuries, particularly in terms of the role of the state in agricultural development. This course emphasizes the historical roots of the socioeconomic problems of contemporary agriculture and examines the prospects for, and limitations of, various strategies for ameliorating these problems.]

**706 State, Economy, and Society** Fall, 3 credits. Recommended: one graduate-level course in classical sociological theory.

T 7–10 p.m. F. H. Buttel.  
Reviews major issues concerning the relations between political and economic institutions, including the political-economic methodologies of the classical sociological theorists, the instrumentalist-structuralist debate on the nature of the state, theories of crisis in advanced capitalism, and the controversies among theorists of unequal exchange, dependency, and imperialism in the world system.

**710 Problem Formulation and Design for Field Research** Spring, 3 credits. Letter grade only.

R 1:25–4:25. P. Garrett.  
A graduate seminar dealing with the design of field research, specifically the articulation of theory and methods. Readings illustrate different theoretical orientations and methodological techniques. Substantive problem areas considered include technological change, social stratification, dependency, and modes of production. Students explore theoretical issues and methodological alternatives applicable to their own research.

**712 Factor Analysis and Multidimensional Scaling** Fall, 4 credits. Prerequisite: previous course work in scaling and statistics.

M W F 10:10; lab to be arranged. J. D. Francis.  
An advanced course in measurement and scaling, building from work by Thurstone and Coombs to multidimensional measurements. Topics include philosophy of factor analysis, factor-analysis models, factoring design, factoring techniques, and comparison with factor-analysis models. Multidimensional scaling and discriminant analyses are also discussed. As matrix algebra is an integral part of these procedures, class time is devoted to this topic.

**[715 Rural Development Information Systems** Spring, 3 credits. Not offered 1983–84.

R 1:25–4. F. W. Young.  
Methods for describing, monitoring, and evaluating both general and project-induced change in poor countries and regions. Integration of qualitative and quantitative approaches, unconventional sources of data, measurement of development, project evaluation, and use of microcomputers for project management and evaluation. Students will design an information system for a low-income country.]

**717 Regression and Path Analysis** Spring, 4 credits. Prerequisite: two courses in statistics and one in methods.

M W F 10:10; lab to be arranged. J. D. Francis.  
The first part of the course reviews simple and multiple regression. Then extensions of these models are discussed. In the middle part of the course, consideration is given to violations of assumptions and their effects. Then more advanced regression concepts are discussed. The latter half of the course deals with recursive and nonrecursive path models.

**721 Ecological Perspectives on Social Change** Spring, 3 credits.

Hours to be arranged. E. W. Coward, Jr., F. H. Buttel.  
Reviews major theoretical traditions in the analysis of societal-environmental relationships and applies these perspectives to public policy and development problems. The theoretical perspectives explored are drawn from human ecology, ecological anthropology, and environmental sociology. Policy issues from developed and developing country settings are examined using ecological perspectives.

**[723 Social Movements in Agrarian Society** Spring, 3 credits. Not offered 1983–84.

T 1:25–4. F. W. Young.  
The recent research explosion in this area is approached in terms of the several fundamental explanatory formats, a comparison of class-based and region-based movements, and research on the United States and the Third World.]

**[740 Community and Property** Spring, 3 credits. Not offered 1983–84.

W 1:25–4:25. 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 sociologists, both classical and contemporary. Readings will cover subjects such as land reform, the changing public interest in land-use regulation, and the "new feudalism" debate.]

**741 Community Development and Local Control** Spring, 3 credits.

W 1:30–4:30. 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."

**[751 Applications of Sociology to Development Programs]** Fall, 3 credits. Not offered 1983–84.

R 1:25–4:25. E. C. Erickson.

A consideration of problems of implementing change strategies at national, regional, and institutional levels, especially as they relate to rural development. Focus is also on institutional constraints on the sociologist as a researcher, as a strategist, and as a participant, and on the different contexts within which developmental change occurs.]

**754 Sociotechnical Aspects of Irrigation (also Agricultural Economics 754 and Agricultural Engineering 754)** Spring, 1–3 credits. S-U grades optional.

Hours to be arranged. R. Barker, M. L. Barnett, E. W. Coward, Jr., G. Levine.

Examines irrigated agriculture and its relation to agricultural development. Emphasis on social processes within irrigation systems, and interactions with the social setting. The seminar provides an opportunity to examine systematically the institutional and organizational policy issues associated with the design and operation of systems of irrigated agriculture.

**771 Special Seminar** Fall or spring. Credit to be arranged. Limited to graduate students; others by permission of instructor.**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.

**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.

**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.**871 Rural Sociology****872 Development Sociology****873 Organization Behavior and Social Action****874 Methods of Sociological Research****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.

## Statistics and Biometry

F. B. Cady, G. C. Casella, W. T. Federer, C. E. McCulloch, D. S. Robson, S. J. Schwager, S. R. Searle

Courses in statistics and biometry are offered by the Department of Plant Breeding and Biometry.

**200 Statistics and the World We Live In** Spring 3 credits.

Lecs, T R 10:10–11:25; disc, M 10:10 or 1:25, or T 9:05, 1:25, or 2:30. Prelims: 6:30–8:30 p.m., R, weeks 4, 8, 13. G. C. Casella.

Focus is on a better consumer understanding of statistical design, data collection, and information. Concepts of statistics, measurements and measuring instruments, data collection, principles of scientific investigation, survey design, questionnaire construction, experiment design, treatment design, graphs, tables, probability, averages, measures of variation, common distributions, confidence intervals, sample size, international and national statistics, and some simple statistical methodology are presented.

**408 Theory of Probability** Fall, 4 credits.

Prerequisite: Mathematics 106, 108, or 112, or permission of instructor.

Lecs, M W F 10:10; disc, M 3:35. Prelims, 7:30 p.m. Oct. 11 and Nov. 15. G. C. Casella.

An introduction to probability theory: combinatorics, random variables and their probability distributions, generating functions, and limit theory. Biological and statistical applications are the focus. Can serve as either a terminal course in probability or as a foundation for a course in the theory of statistics.

**409 Theory of Statistics** Spring 4 credits.

Prerequisite: Statistics 408 or equivalent.

Lecs, M W F 10:10; disc, M 3:35. Prelims: 7:30 p.m. Mar. 1 and Apr. 12. Staff.

The concepts developed in Statistics 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 training in statistical methodology should consider Statistics 601–607.

**416 Matrix Algebra I** Fall, first 7 weeks. 2 credits.

Prerequisite: precalculus mathematics. Dropping course is not permitted after Sept. 21.

Lecs, M W F 8; disc, M 1:25–3:10. Prelim: 7–8:30 p.m. Sept. 29. Final: 7–8:30 p.m. Oct. 20. S. R. Searle.

Definitions, basic operations and arithmetic, determinants, and the inverse matrix. Emphasis is on understanding basic ideas.

**417 Matrix Algebra II** Fall, second 7 weeks.

2 credits. Prerequisite: Statistics 416 or permission of the instructor. No auditors. Dropping the course is not permitted after Nov. 9.

Lecs, M W F 8; disc, M 1:25–3:20. Prelim: 7–8:30 p.m. Nov. 17. Final during University exam week. S. R. Searle.

Rank, linear dependence, canonical forms, linear equations, generalized inverses, characteristic roots and vectors. Emphasis is on developing skills for applying matrix algebra.

**496 Statistical Consulting** Fall or spring

2 credits. Limited to undergraduates. Prerequisites: Statistics 409 and 602 plus permission of instructor.

Lec, W 1:25–2:15 plus one hour of consulting. 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.

**498 Supervised Teaching** Fall or spring 2 credits.

Limited to statistics and biometry undergraduates. Staff.

The student assists in teaching a course appropriate to his or her previous training. The student will meet with a discussion or laboratory section and regularly discuss objectives with the professor in charge of the course.

**499 Undergraduate Research** Fall or spring.

Credit to be arranged. Limited to statistics and biometry undergraduates. Prerequisite: permission of faculty member directing research. Staff.

**600 Statistics Seminar** Fall or spring. 1 credit. S-U grades only.

W 3. Staff.

**601 Statistical Methods I** Fall, 4 credits. Limited to graduate students; others by permission of instructor.

Lecs, M W F 9:05 or 11:15; lab, M 12:20–1:50 (two sections), 2:30–4 (two sections), 7:30–9, or T 12:20–1:50 or 2:30–4 (two sections). C. E. McCulloch.

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 the MINITAB statistical computing system. Emphasis is on basic principles and criteria for selection of statistical techniques.

**602 Statistical Methods II** Spring, 4 credits.

Prerequisite: Statistics 601 or equivalent.

Lecs, M W F 9:05 or 11:15; lab, M 12:20–2:15 or 2:30–4:25, or T 10:10–12:05 or 12:20–2:15. Prelim: 7 p.m. Feb. 16. F. B. Cady.

A continuation of Statistics 601. Emphasis on (1) data analysis and inference for a wide variety of research situations using standard multiple regression programs, and (2) design of experiments. Case studies and hands-on computing using the SAS statistical computing package. Topics include estimating and interpreting sequential and partial coefficients and sums of squares, prediction, residual plotting, model building, estimation of standard errors, principles and practice of randomization, replication and blocking analysis of sample means from one-way and multiway classifications, factorial experiments, estimation of contrasts, covariance analysis, comparison of regression lines, model (variable) selection with many predictor variables, split plot experiments, nested models, and variance components. Selected topics from pairwise comparisons among means, transformations of data, response surface methodology, treatment design, weighted regression, balanced incomplete blocks, nonlinear model estimation, random effects models, repeated measurements studies, combining experiments, analysis of categorical data, and multivariate analysis.

**[605 Applied Regression Analysis]** Fall, 1 credit.

Prerequisite: Statistics 409 and 602. Not offered 1983–84.

A continuation of Statistics 602, with emphasis on data analysis using a regression or linear model approach. Comparison of variable selection procedures. Biased estimation. Variable selection for prediction. Regression approach to nonorthogonal analysis of variance situations. Case study for complex data set.]

**[606 Sampling Biological Populations]** Fall.

1 credit. Prerequisite: Statistics 601 or equivalent. Offered alternate years. Not offered 1983–84.

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.]

**607 Nonparametric and Distribution-Free**

**Statistical Methods** Spring, 1 credit. Prerequisite: Statistics 601 or equivalent. Offered alternate years.

C. E. McCulloch.

Nonparametric and distribution-free alternatives to normal-theory testing procedures are presented: randomization tests; location and scale tests for two populations; analyses for completely randomized, randomized blocks, and balanced incomplete blocks designs; comparisons among several means; correlation and regression; goodness-of-fit.

**[662 Mathematical Ecology (also Biological Sciences 662)]** Spring. 3 credits. Prerequisites: a year of calculus, a course in statistics. Offered in alternate years. Not offered 1983–84. 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.]

**699 Special Problems in Statistics and Biometry** Fall, spring, or summer. 1 credit or more by arrangement with instructor.  
Staff.

**701 Advanced Biometry** Spring. 3 credits. Prerequisites: Statistics 409 and 602.  
T R 1:30–2:45. D. S. Robson.  
Bioassay methods including parametric and nonparametric statistical analyses of quantal and graded response to controlled levels of single and multifactor stimuli; directional statistics as applied to animal orientation experiments; compartment models and analyses; enzyme kinetics and pharmacokinetic analysis; bioavailability.

**713 Experimental Design** Fall. 4 credits. Prerequisites: either Statistics 416 and 602 or equivalent. Offered alternate years.  
W. T. Federer.  
Principles and techniques of experimentation, theoretical concepts, extensions and variations of the completely randomized, generalized blocked, and generalized row-by-column experiment designs, repeated measures designs, interval estimation for ranked means, transformations, unequal variances, additivity, residual analyses, sample size, variance component analyses, unequal number analyses, the place of orthogonality, balance and confounding in design, model selection, and advanced statistical methodology.

**[714 Treatment Design and Related Experiment Designs]** Fall. 4 credits. Prerequisites: Statistics 416–417 and 602. Offered alternate years. Not offered 1983–84. Treatment design, the selection of treatments for an experiment, is divided into factorial, response surfaces, mixtures, and combinations of these. Single degree of freedom contrast matrices, factorial design theory for prime powers and nonprime powers, confounding, split plot, split block, complex confounded designs, lattice designs derivable from pseudofactorial theory, fractional replication, response surface designs, and designs and analyses for mixtures, including diallel crossing designs, are covered. Statistical analyses involving residual analyses and real data are included. Emphasis is on concepts and applications rather than mathematical manipulations.]

**717 Linear Models** Spring. 3 credits. Prerequisites: Statistics 409, 417, and 602 or Mathematics 472. S-U grades only. Offered alternate years.  
Lecs, T R 10:10–11:25. S. R. Searle.  
Introduction to multivariate variables and distribution of quadratic forms; linear statistical models, estimable functions and testable hypotheses, regression models, experimental design models, and variance component models and combinations thereof.

**799 Statistical Consulting** Fall and spring. 2 credits. Limited to graduate students.  
Consulting, 1 hour a week; disc, W 1:25–2:15. 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.

**890–990 Research** Fall or spring. Credit to be arranged. Limited to candidates for graduate degrees. Prerequisite: permission of the graduate field member concerned. S-U grades only. Research at the M.S. (890) or Ph.D. (990) level.

## Vegetable Crops

E. E. Ewing, chairman; L. Ellerbrock, J. R. Hicks, W. C. Kelly, D. Lisk, P. M. Ludford, P. L. Minotti, M. A. Mutschler, R. F. Sandsted, L. D. Topoleski, D. H. Wallace, H. C. Wien

**103 General Horticulture** Spring. 4 credits. Each lab limited to 25 students.  
Lecs, M W F 8; lab, M T W R 2–4:25.  
L. D. Topoleski.  
Acquaints the student with applied and basic horticulture. Primarily for 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.

**123 Organic Gardening** Spring. 2 credits. Each section limited to 20 students. Primarily for students not enrolled in the College of Agriculture and Life Sciences. Prerequisite: permission of instructor.  
M T or W 1:25–4:25. W. C. Kelly.  
Students must be prepared to lead a discussion and write a paper on some aspect of home gardening or amateur horticulture. Organic methods of gardening are discussed and demonstrated, but other methods are not excluded from the discussions.

**210 Vegetable Types and Identification** Fall. 2 credits.  
T 10:10–12:05 or 2–4. L. D. Topoleski.  
Acquaints the student 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.

**211 Commercial Vegetable Crops** Fall. 4 credits. Each section limited to 25 students. Prerequisites: Vegetable Crops 103 and Agronomy 200. Field trip fee, no more than \$20.  
Lecs, M W F 11:15; lab, W or F 2–4:25; field trips (Sept.), W 11:15–6. L. A. Ellerbrock.  
Intended for those interested in the commercial vegetable industry from the viewpoint of production, processing, marketing, or the related service industries. Topics included are techniques, problems and trends in the culture, harvesting, and storage of the major vegetable crops, including potatoes.

**312 Postharvest Handling and Marketing of Vegetables** Fall. 3 credits.  
Lecs, T R 9:05; lab, R 2–4:25; field trips in early fall. J. R. Hicks.  
Procedures used in marketing and shipping vegetables, including grade standards, methods of grading, packaging, harvesting methods, cooling principles, storage techniques, and market preparation.

**401 Vegetable Crop Physiology** Fall. 5 credits. Prerequisites: Vegetable Crops 211 and Biological Sciences 242 or equivalents.  
Lecs, M W F 11:15; lab, M 2–4:25; disc, R or F 1, 2, or 3. W. C. Kelly.  
Subjects include mineral nutrition as influenced by fertilization programs and crop sequence, nutrient interactions and induced deficiencies, growth and development, flowering, fruit setting, growth correlation, senescence, sex expression, photoperiodism, vernalization, and environmental factors affecting growth.

**[413 Kinds and Varieties of Vegetables]** Fall. 4 credits. Prerequisite: Vegetable Crops 211 or permission of instructor. Offered alternate years. Not offered 1983–84.  
Lab, W F 2–4:25. H. C. Wien.  
Designed to help students achieve proficiency in the evaluation of vegetable varieties through study of their origins, characteristics, adaptation, and usage. An important part of the course is the study of crops in the field. The vegetable seed industry is also discussed.]

**[421 Plant-Plant Interactions]** Spring. 3 credits. Prerequisites: Any crop production course or permission of instructor. Not offered 1983–84.  
Lecs, M W 8; disc, F 8. P. L. Minotti.  
The manner in which plants affect the growth of other plants is examined with emphasis on crop situations rather than natural plant communities. Interactions in monoculture are considered as well as crop–associate crop interactions and weed-crop interactions. Fridays are devoted to a discussion of weed control methods widely used in the production of vegetable crops.]

**499 Undergraduate Research** Fall or spring. 1 or more credits, by arrangement. Written permission from staff member directing the work must be obtained before course enrollment.  
Hours to be arranged. Staff.  
Special problems may be elected in any line of vegetable work.

**601 Seminar** Fall or spring. 1 credit. Required of graduate students majoring or minoring in vegetable crops. Limited to graduate students. S-U grades only.  
R 4:30. Staff.

**610 Special Topics in Vegetable Crops** Fall or spring. 1 or more credits.  
Hours to be arranged. Staff.

**[612 Postharvest Physiology of Horticultural Crops]** Spring. 2 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1983–84.  
T R 8. 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 in ripening and during storage life, some physiological disorders, aspects of hormone action and interaction, and a consideration of control.]

**620 Teaching Experience** Fall or spring. 1 or more credits by arrangement with instructor.  
Hours to be arranged. Staff.  
Participation in the teaching program of the department.

**[630 Research Methods in Applied Plant Science]** Spring. 3 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1983–84.  
T R 9:05–11. W. C. Kelly.  
The planning of applied research programs. The advantages and limitations of conventional experimental designs as they apply to specific research problems. Discussions include a critical interpretation of experimental results from the literature.]

**801 Master's Thesis Research** Fall or spring. Credit to be arranged. S-U grades only.  
Hours to be arranged. Staff.

**901 Doctoral Thesis Research** Fall or spring. Credit to be arranged. S-U grades only.  
Hours to be arranged. Staff.

## Related Course in Another Department

**Special Topics in Plant Science Extension (Plant Breeding 629)**

## Faculty Roster

- Abawi, George S., Ph.D., Cornell U. Assoc. Prof., Plant Pathology (Geneva)
- Acree, Terry E., Ph.D., Cornell U. Prof., Food Science and Technology (Geneva)
- Adeleman, Marvin I., M.L.A., Harvard U. Prof., Floriculture and Ornamental Horticulture
- Ainslie, Harry R., Ph.D., Kansas State U. Prof., Animal Science
- Aist, James R., Ph.D., U. of Wisconsin. Assoc. Prof., Plant Pathology
- Albright, Louis D., Ph.D., Cornell U. Assoc. Prof., Agricultural Engineering
- Alconero, R., Ph.D., U. of Wisconsin. Assoc. Prof., Seed and Vegetable Sciences (Geneva)
- Aldwinckle, Herbert S., Ph.D., U. of London (England). Assoc. Prof., Plant Pathology (Geneva)
- Alexander, Martin, Ph.D., U. of Wisconsin. Liberty Hyde Bailey Professor of Soil Science, Agronomy
- Allee, David J., Ph.D., Cornell U. Prof., Agricultural Economics
- Anderson, Bruce L., Ph.D., U. of California at Berkeley. Asst. Prof., Agricultural Economics
- Anderson, Ronald E., Ph.D., U. of Wisconsin. Assoc. Prof., Plant Breeding and Biometry
- Appar, 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. Assoc. Prof., Poultry and Avian Sciences
- Awa, Njoku E., Ph.D., Cornell U. Assoc. Prof., Communication Arts
- Baer, Richard A., Ph.D., Harvard U. Prof., Natural Resources
- Bail, Joe P., Ph.D., Michigan State U. Prof., Education
- Baker, Robert C., Ph.D., Purdue U. Prof., Poultry and Avian Sciences
- Bandler, David K., M.P.S., Cornell U. Assoc. Prof., Food Science
- Barbano, David M., Ph.D., Cornell U. Asst. Prof., Food Science
- Barker, Randolph, Ph.D., Iowa State U. Prof., Agricultural Economics
- Barnett, Milton L., Ph.D., Cornell U. Prof., Rural Sociology
- Barton, Donald W., Ph.D., U. of California at Berkeley. Prof., Seed and Vegetable Sciences (Geneva)
- Bartsch, James A., Ph.D., Purdue U. Asst. Prof., Agricultural Engineering
- Bassuk, Nina L., Ph.D., U. of London (England). Asst. Prof., Floriculture and Ornamental Horticulture
- Bauman, Dale E., Ph.D., U. of Illinois. Prof., Animal Science
- Bayer, George H., Ph.D., Cornell U. Prof., Vegetable Crops
- Beer, Steven V., Ph.D., U. of California at Davis. Assoc. Prof., Plant Pathology
- Beermann, Donald H., Ph.D., U. of Wisconsin. Asst. Prof., Animal Science
- Bergstrom, Gary C., Ph.D., U. of Kentucky. Asst. 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
- Bing, Arthur, Ph.D., Cornell U. Prof., Floriculture and Ornamental Horticulture
- Blandford, David, Ph.D., Manchester U. Assoc. Prof., Agricultural Economics
- Blanpied, George D., Ph.D., Michigan State U. Prof., Pomology
- Bloom, Stephen E., Ph.D., Penn State U. Prof., Poultry and Avian Sciences
- Boisvert, Richard N., Ph.D., U. of Minnesota. Prof., Agricultural Economics
- Bouldin, David R., Ph.D., Iowa State U. Prof., Agronomy
- Bourke, John B., Ph.D., Oregon State U. Prof., Food Science and Technology (Geneva)
- Bourne, Malcolm C., Ph.D., U. of California at Davis. Prof., Food Science and Technology (Geneva)
- Bouthyette, Pierre-Yves, Ph.D., Cornell Asst. Prof., Plant Breeding and Biometry
- Bowers, William S., Ph.D., Purdue U. Prof., Entomology (Geneva)
- Boyd, R. Dean, Ph.D., U. of Nebraska. Asst. Prof., Animal Science
- Boynton, Robert D., Ph.D., Michigan State U. Assoc. Prof., Agricultural Economics
- Brake, John R., Ph.D., North Carolina State U. W. I. Myers Professor of Agricultural Finance, Agricultural Economics
- Broadwell, George J., Ph.D., Cornell U. Assoc. Prof., Cooperative Extension
- Brodie, Bill B., Ph.D., North Carolina State U. Prof., Plant Pathology
- Brown, William L., Jr., Ph.D., Harvard U. Prof., Entomology
- Bruce, Robert L., Ph.D., Cornell U. Prof., Education
- Brumsted, Harlan B., Ph.D., Cornell U. Assoc. Prof., Natural Resources
- Bryant, Ray B., Ph.D., Purdue U. Asst. Prof., Agronomy
- Bugliari, Joseph B., L.L.B., Cornell U. Prof., Agricultural Economics
- Burr, Thomas J., Ph.D., U. of California at Berkeley. Asst. Prof., Plant Pathology (Geneva)
- Butler, Walter R., Ph.D., Purdue U. Assoc. Prof., Animal Science
- Buttel, Frederick H., Ph.D., U. of Wisconsin. Assoc. Prof., Rural Sociology
- Call, David L., Ph.D., Cornell U. Prof., Agricultural Economics
- Campbell, Joseph K., M.S., Cornell U. Assoc. Prof., Agricultural Engineering
- Capener, Harold R., Ph.D., Cornell U. Prof., Rural Sociology
- Carruthers, Raymond I., Ph.D., Michigan State U. Asst. Prof., Entomology
- Casella, George, Ph.D., Purdue U. Asst. Prof., Plant Breeding and Biometry
- Casler, George L., Ph.D., Purdue U. Prof., Agricultural Economics
- Chapman, Lewis D., Ph.D., U. of California at Berkeley. Prof., Agricultural Economics
- Chase, Larry E., Ph.D., Penn State U. Assoc. Prof., Animal Science
- Coffman, William R., Ph.D., Cornell U. Prof., Plant Breeding and Biometry
- Colle, Royal D., Ph.D., Cornell U. Prof., Communication Arts
- Combs, Gerald F., Jr., Ph.D., Cornell U. Assoc. Prof., Poultry and Avian Sciences
- Compton, James L., Ph.D., U. of Michigan. Assoc. Prof., Education
- Conneman, George J., Ph.D., Penn State U. Prof., Agricultural Economics
- Conrad, Jon M., Ph.D., U. of Wisconsin. Assoc. Prof., Agricultural Economics
- Cooke, J. Robert, Ph.D., North Carolina State U. Prof., Agricultural Engineering
- Cottrell, Thomas H., Ph.D., U. of Rochester. Assoc. Prof., Food Science and Technology (Geneva)
- Coward, E. Walter, Ph.D., Iowa State U. Prof., Rural Sociology
- Creasy, Leroy L., Ph.D., U. of California at Davis. Prof., Pomology
- Cummings, Gordon J., Ph.D., Cornell U. Prof., Rural Sociology
- Cummins, James N., Ph.D., Southern Illinois U. Prof., Pomology and Viticulture (Geneva)
- Cunningham, Danis L., Ph.D., Virginia Polytechnic Inst. Asst. Prof., Poultry and Avian Sciences
- Cupp, Eddie W., Ph.D., U. of Illinois. Assoc. Prof., Entomology
- Currie, W. Bruce, Ph.D., Macquarie U. Assoc. Prof., Animal Science
- Cushman, Harold R., Ph.D., Cornell U. Prof., Education
- Davis, Alexander C., Ph.D., Cornell U. Prof., Entomology (Geneva)
- Day, Lee M., Ph.D., U. of Minnesota. Prof., Agricultural Economics
- Delwiche, Eugene A., Ph.D., Cornell U. Prof., Microbiology
- Dethier, Bernard E., Ph.D., Johns Hopkins U. Prof., Agronomy
- Dewey, James E., Ph.D., Cornell U. Prof., Entomology
- Dickey, Robert S., Ph.D., U. of California at Berkeley. Prof., Plant Pathology
- Dickson, Michael H., Ph.D., Michigan State U. Prof., Seed and Vegetable Sciences (Geneva)
- Dieter, Rodney R., Ph.D., U. of Texas at Austin. Asst. Prof., Poultry and Avian Sciences
- Dockerty, Terence R., Ph.D., Ohio State U. Asst. Prof., Animal Science
- Dolan, Desmond D., Ph.D., Cornell U. Assoc. Prof., Seed and Vegetable Sciences (Geneva)
- Dondero, Norman C., Ph.D., Cornell U. Prof., Microbiology
- Downing, Donald L., Ph.D., U. of Georgia. Prof., Food Science and Technology (Geneva)
- Drake, William E., Ph.D., Michigan State U. Prof., Education
- Duke, William B., Ph.D., U. of Illinois. Prof., Agronomy
- Dunn, James A., Ph.D., U. of Michigan. Prof., Education
- Durnford, Deanna, Ph.D., Colorado State U. Asst. Prof., Agricultural Engineering
- Duxbury, John M., Ph.D., U. of Birmingham. Assoc. Prof., Agronomy
- Earle, Elizabeth D., Ph.D., Harvard U. Assoc. Prof., Plant Breeding and Biometry
- Eberts, Paul R., Ph.D., U. of Michigan. Assoc. Prof., Rural Sociology
- Eckenrode, Charles J., Jr., Ph.D., U. of Wisconsin. Prof., Entomology (Geneva)
- Egner, Joan R., Ed.D., Cornell U. Prof., Education
- Eickwort, George C., Ph.D., U. of Kansas. Prof., Entomology
- Ellerbrock, LeRoy A., Ph.D., Cornell U. Asst. Prof., Vegetable Crops
- Elliott, John M., Ph.D., Cornell U. Prof., Animal Science
- Erickson, Eugene C., Ph.D., Michigan State U. Prof., Rural Sociology
- Everett, Herbert L., Ph.D., Yale U. Prof., Plant Breeding and Biometry
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Upperclass students have no regular assigned advisers and are free to seek assistance and advice from the most appropriate faculty member or college officer.

Specific inquiries regarding rules, procedures, or deadlines should be addressed to:

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## Degree Programs

	Degree
Architecture	B.Arch.
City and Regional Planning	B.S.
Fine Arts	B.F.A.
History of Architecture and Urban Development	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; and a two-year program with a concentration in urban and regional studies leads to the Bachelor of Science.\*

Graduate-level programs are offered in art, architectural design and urban and regional design, architectural sciences, history of architecture and urban development, 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.

\*This program is limited to transfer students at the junior and senior level.

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, Tjaden Hall, Rand Hall, and the Foundry. In Sibley are the facilities for architecture, and city and regional planning as well as certain administrative offices and the Fine Arts Library. The Department of Art is housed in Tjaden Hall. Sculpture and shop facilities are in the Foundry. The Green Dragon, a student lounge, is located in the basement of Sibley Hall. The college has three darkrooms that are available for general use 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 in the slide library.

Through the generosity of the late Mrs. Lillian P. Heller, the college also owns the 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 Dome, serves the College of Architecture, Art, and Planning through its collections on architecture, fine arts, and city and regional planning. The library, with more than 112,000 books, is capable of supporting undergraduate, graduate, and research programs. Some 1,800 serials are currently received and maintained.

A slide library is maintained in Sibley Hall and contains extensive files of architectural history slides and a large and growing collection of slides of art and architecture from all parts of the world. The library now includes approximately 250,000 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 new 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 Tjaden Hall.

## 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 will be held each semester as part of the yearly schedule of the Tjaden Hall gallery and the Hartell Gallery. These may display the work of a specific course or exhibit examples of the best recent work done.

## Scholastic Standards

Term by term, a candidate for an undergraduate degree in this 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 may be suspended.

2) **Final Warning** indicates that the student's record is unsatisfactory. Unless considerable improvement is shown in the subsequent term, the student is subject to dismissal from the college.

3) **Suspended: Academic Deficiency** The student is dismissed from the college and may not continue studies in the college. A student who has been suspended may apply for readmission after an absence of at least two semesters. Application for readmission is made by letter, addressed to the associate dean, College of Architecture, Art, and Planning. The student must submit evidence that his time has been well spent since suspension, and, if employed, must submit a letter from an immediate superior. Readmission to the college after being suspended is at the discretion of the Admissions Committee.

4) **Dismissed: 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 suspended for academic deficiency at the end of the next term if the performance during that time is deemed to be grossly deficient.

It is necessary to have a cumulative average of at least C—(1.7) for graduation.

## Architecture

J. A. Wells, chairman; P. M. Cohen, R. W. Crump, M. D. Dennis, W. Goehner, D. P. Greenberg, G. Hascup, L. F. Hodgden, A. Kira, M. Kubelik, B. G. MacDougall, R. D. MacDougall, A. B. Mackenzie, J. C. Miller, L. Mirin, V. Mulcahy, C. F. Otto, C. W. Pearman, J. Pittman, H. W. Richardson, M. Romanach, C. Rowe, F. W. Saul, M. L. Schack, M. Schlier, A. Senkevitch, Jr., J. P. Shaw, O. M. Ungers, V. Warke

## 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 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

applied, had 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 human behavior, 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 and be applied by further studies in these areas. Within the professional program, a basis for understanding architecture in its contemporary and historical cultural context 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 to the Bachelor of Architecture degree and 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.

#### Washington Program

Fourth- and fifth-year students in good standing who have completed the requirements of the first three years of the curriculum are eligible for a term of study in Washington, D.C. Outstanding third-year students are admitted to the Washington program only by petition and a review of their design record. Courses offered by the department include design, introduction to the thesis, special problems in architectural design, a professional seminar, and a professional studies course. Additional courses are offered by other departments participating in the program. The program provides a period of intensive exposure to the characteristics of urban development within the framework of a design studio. Content concentrates on urban design issues, restraints relative to financing, zoning, development criteria, adaptive reuse, and multiuse developments.

#### 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 for Arch 501–502 and Arch 510 (Thesis Introduction). 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 and other advanced courses taken in excess of distribution requirements for the Bachelor of Architecture degree.

#### Curriculum

##### First Year

<i>Fall Term</i>		Credits
101 Design I		6
131 Introduction to Architecture		2
181 History of Architecture I		3
151 Design Fundamentals I		2
191 Drawing I		2
Out-of-college elective		3
		18

<i>Spring Term</i>		
102 Design II		6
182 History of Architecture II		3
152 Design Fundamentals II		2
162 Introduction to Social Sciences in Design		2
192 Drawing II		2
Out-of-college elective		3
		18

##### Second Year

<i>Fall Term</i>		
201 Design III		6
221 Mathematical Techniques		3
231 Architectural Elements and Principles		2
262 Building Technology, Materials, and Methods		3
Out-of-college elective		3
		17

<i>Spring Term</i>		
202 Design IV		6
222 Structural Concepts		4
232 Design Methods and Programming		2
261 Environmental Controls—Site Planning		3
College elective		3
		18

##### Third Year

<i>Fall Term</i>		
301 Design V		6
321 Structural Systems I		3
361 Environmental Controls—Lighting and Acoustics		3
Out-of-college elective		3
Departmental elective		3
		18

<i>Spring Term</i>		
302 Design VI		6
322 Structural Systems II		3
362 Environmental Controls—Mechanical and Passive Solar Systems		3
Out-of-college elective		3
Departmental elective		3
		18

##### Fourth Year

<i>Fall Term</i>		
401 Design VII		6
481 Professional Practice		3
Out-of-college elective		3
College elective		3
Departmental elective		3
		18

<i>Spring Term</i>		
402 Design VIII		6
Out-of-college elective		3
College or out-of-college elective		3
Departmental elective		3
College elective		3
		18

##### Fifth Year

<i>Fall Term</i>		
501 Design IX		6
or 503 Design IX—Thesis I		8
or 601 Special Program		9
510 Thesis Introduction		3
Out-of-college elective		3
Departmental elective		3
Out-of-college elective		3
		18, 20, or 21

<i>Spring Term</i>		
502 Design X—Thesis		8
or 504 Design X—Thesis II		8
or 602 or 604 Special Program		9
College or out-of-college electives (two courses)		6
Departmental elective		3
		17 or 18
Total credits		178

#### Elective Distribution Requirements

	Credits
Departmental electives	18
College or out-of-college electives	9
College electives	9
Out-of-college electives	27
Total electives	63

#### Departmental Elective Distribution Requirements

	Credits
History of architecture courses	6
Principles, theories, and methods, and nonsequence design courses	6
Design communication, any art or computer graphics course	3
Architectural science course	3

#### College Elective Distribution Requirements

Two art courses, including a course in sculpture	6
Planning course	3

#### Out-of-College Elective Distribution Requirements

Mathematics, physics, or biological sciences course	3
Humanities courses	6
Social science courses	6
Computer programming course	3

#### 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 an 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.

#### Nonprofessional Alternative Program

After completing the first four years of requirements, the student may choose to receive the nonprofessional degree of Bachelor of Fine Arts (B.F.A.) in architecture.

The first two years of the professional program are considered a basic introduction to the field. It is possible after this phase to depart from the professional program to develop a concentration in some area of the broader field without the intention of becoming a licensed practicing architect. A student choosing an undergraduate nonprofessional major

should apply in writing to the department chairperson by February 1 in the second year. The student will be interviewed and informed of acceptance by March 1.

A program developing a major concentration in the third and fourth years, leading to the nonprofessional Bachelor of Science degree in history of architecture and urban development is available. A student attaining this degree can either terminate studies or apply to a graduate program in that area of concentration.

### History of Architecture and Urban Development

The major in history of architecture and urban development is intended for undergraduate students interested in historical studies of architecture and planning offered in the context of a professional school. The program benefits from a tradition of pioneer work in the history of architecture and urban development that has grown at Cornell for several decades. Special features of the major are the availability of work in city and regional planning, and in preservation planning. Sixteen members of the college faculty offer courses appropriate for this major.

**Admission to the major.** Architectural history and urban development may be elected as a major if a student has completed Architecture 181 and 182 with a grade of B or better. Other students must petition for admission to the major.

**Requirements.** To satisfy the major subject requirement, a minimum of 40 credits of history course work must be completed with a grade of C or better. Of these 40 credits, 26 must be in architectural history and urban development, with 8 of these 26 credits obtained in courses above the intermediate level. In addition, 8 credits must be taken in related fields such as history of art; archaeology; intellectual, cultural, or political history; and history of science.

Majors will be expected to meet the language requirement in the manner specified for students enrolled in the College of Arts and Sciences.

**Honors program.** Students who want to enroll in the honors program must indicate their intention in writing before the end of their junior year and be accepted for the program by the history of architecture faculty. Minimum requirements for admission to candidacy for honors are:

- 1) a cumulative average of B— or better in all courses
- 2) a cumulative average of B or better in all history of architecture and urban development courses.

Honors candidates will take a 4-credit research course in the fall of their senior year. In the spring there will be a 4-credit session during which they will prepare and defend an architectural history presentation or demonstration, or a paper approximately fifty pages long.

**Curriculum.** Students must have already completed the first two years of the Bachelor of Architecture curriculum, for a total of 70 credits.

### Third Year

Fall Term	Credits
Fine art elective	3
Related field courses	4
History of architecture (intermediate level) or history of urban development	4
Electives	4
	15

### Spring Term

Related field courses	4
History of architecture (intermediate level) or history of urban development	4
Electives	8
	16

### Fourth Year

Fall Term	
History of architecture (advanced level) or history of urban development	4
Honors or history-related subject	4
Electives	8
	16

### Spring Term

History of architecture (advanced level) or history of urban development	4
Honors or history-related subject	4
Electives	7
	15

Students complete a total of 132 credits.

### 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 are offered at second- through fifth-year levels in Ithaca. Normally, there is also a design program abroad for third-, fourth-, and fifth-year students.

Registration is limited to students in good standing who have completed the sophomore year of study. In exceptional cases, a student who has completed only one year of study may be allowed to register.

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

A **studio fee** of \$10 is charged each semester for every design course.

### Sequence Courses

**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.

**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.

**201–202 Design III and IV** Fall and spring. 6 credits each term. Coregistration in Architecture 231–232 required. Limited to department students. Studios and sems, M W F 2–6. Staff.

**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.

**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 are offered each term.

**501 Design IX** Fall or spring. 6 credits. Limited to department students.

Studios, M W F 2–6. Staff.

**502 Design X—Thesis** Fall or spring. 8 credits. Prerequisite: Architecture 510. Required of B.Arch. candidates, who must satisfactorily complete a thesis during one term of their last year in residence. Students accepted for admission to the Overlap Program are exempt from the thesis requirement. Studios, M W F 2–6. Staff.

**503–504 Design IX—Thesis I, and Design X—Thesis II** Fall or spring. 8 credits each term. Prerequisite: permission of department.

Studios, M W F 2–6. Staff.

Students who have obtained approval may elect to spend two terms working on the thesis.

**510 Thesis Introduction** Fall or spring. 3 credits

Required of all architecture students in the year preceding work on their thesis.

Lec and sem, R 1:25–4:25. 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 is followed by tutorial work with the student's advisory committee.

**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.

**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.

### Elective Design Courses

**111–112 Elective Design Studio** 111, fall; 112, spring. 6 credits each term. Limited to students from outside the department. Prerequisite: permission of instructor.

M W F 2–6. Staff.

**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.

### Nonsequence Courses

**310 Special Problems in Architectural Design**

Fall or spring. Registration and credit by arrangement.

Hours to be arranged. Staff. Independent study.

**[611–612 Urban Housing Developments** 611, fall; 612, spring. 2 credits each term. Limited to fourth- and fifth-year students in architecture, and graduate students. Prerequisite: permission of instructor. Not offered 1983–84.

Sem, hours to be arranged. O. M. Ungers.

Large-scale housing developments, particularly size, density, and problems of infrastructure.]

**[613 Transportation** Fall. 2 credits. Prerequisite: permission of instructor. Not offered 1983–84.

Sem, hours to be arranged. P. Cohen.

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.]



**614 Low-Cost Housing** Fall or spring. 3 credits  
Prerequisite: permission of instructor.

Sems, hours to be arranged. F. O. Slate,  
H. W. Richardson.

Aspects of low-cost housing involving engineering technology, architecture, physical planning, economics, and sociology.

**[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 1983-84.

Hours to be arranged. O. M. Ungers, 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.]

#### Graduate Courses

**711-712 Problems in Architectural Design** Fall and spring. 9 credits each term.

Studio and sem, hours to be arranged.

W. Goehner.

Basic first-year design course for graduate students whose major concentration is architectural design.

**713-714 Problems in Urban Design** Fall and spring. 9 credits each term.

Studio and sem, hours to be arranged. C. Rowe.

Basic first-year design course for graduate students whose major concentration is urban design.

**811 Thesis or Research in Architectural Design** Fall or spring. 9 credits.

Hours to be arranged. W. Goehner.

Second-year design course for graduate students whose major concentration is architectural design.

**812 Thesis or Research in Urban Design** Fall or spring. 9 credits.

Hours to be arranged. C. Rowe.

Second-year design course for graduate students whose major concentration is regional design.

#### Structures Courses

**002 Basic Mathematics** Fall or spring. 2 credits  
Limited to freshmen. Credits earned for this course may not be applied toward credits required for graduation.

Hours to be arranged. F. W. Saul.

A review of basic mathematics.

#### Sequence Courses

**221 Mathematical Techniques** Fall. 3 credits.  
Lecs, T R 10:10-11; rec to be arranged.

Mathematics department staff.

Mathematical concepts and operations used in architecture are introduced.

**222 Structural Concepts** Fall or spring. 4 credits  
Prerequisite: Architecture 221 or approved equivalent.

Lecs and sems, T R 9:05-11. F. W. Saul.

Fundamental concepts of structural behavior. Statics and strength of materials.

**321 Structural Systems I** Fall. 3 credits.  
Prerequisites: Architecture 221 and 222.

Lecs and sems, T R 11:15-1:10. F. W. Saul.

Structural design concepts and procedures for steel building construction.

**322 Structural Systems II** Spring. 3 credits.  
Prerequisite: Architecture 222.

T R 11:15-1:10. F. W. Saul.

Structural design concepts and procedures for reinforced concrete building construction.

#### Nonsequence Courses

**326 Building Substructure** Spring. 3 credits  
Prerequisites: Architecture 322 or concurrent registration and permission of instructor.

Sem, hours to be arranged. F. W. Saul.

The principles of soil mechanics and subsurface exploration. Design of building foundations—footings, piles, and subgrade walls.

#### Architectural Principles, Theories, and Methods

##### Sequence Courses

**131 Introduction to Architecture** Fall. 2 credits  
Open to students in other colleges.

Lec, T R 3:35-5:30. Staff.

The built and natural environments are introduced as a context for culture. Architecture as an environmental-design discipline and its relation to other fields is discussed.

**231 Architectural Elements and Principles** Fall. 2 credits. Architecture students must register concurrently in Architecture 201.

Studios and lecs, T R 1:30-3:25. Staff.

Theory of the order, perception, and function of architectural space. Discourse on the nature of architectural systems and the multiplicity of ways they can be used to solve architectural problems.

**232 Design Methods and Programming** Spring. 2 credits. Architecture students must register for this course concurrently with Architecture 202.

Studios and lecs, T R 1:30-3:25. Staff.

Basic methods for developing architectural programs. Programming as a conceptual as well as a descriptive task is emphasized. Basic methods of design. Analytic and synthetic skills are stressed.

#### Nonsequence Courses

**331 Special Problems in Principles, Theories, and Methods** Fall or spring. Registration and credit by arrangement with instructor.

Hours to be arranged. Staff.

Independent study.

**333-334 Computer Graphics (also Computer Science 417-418)** 333, fall; 334, spring. 4 credits.  
Prerequisites: two terms of calculus and Computer Science 211, or equivalent.

Lecs, T R 9:05-9:55. 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.

**335 Theory of Architecture** Fall or spring. 3 credits each term. Prerequisite: Architecture 231-232 or permission of instructor.

Lecs, T R 4:40-6:30 p.m. L. Hodgden.

**[336 Theory of Architecture]** Fall. 3 credits  
Limited to third-year students and above. Not offered 1983-84; next offered 1984-85.

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.]

**337 Special Investigations in the Theory of Architecture I** Fall or spring. Variable credit  
Prerequisite: permission of the instructor.

Hours to be arranged. Staff.

Independent study.

**[338 Computers in Architecture Seminar]** Fall. 2 credits. Prerequisites: Computer Science 100 or equivalent. Not offered 1983-84.

Hours to be arranged. 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.]

**[339 Architectural Computer Applications]** Spring. 3 credits. Prerequisites: Computer Science 100 or second-year standing. Not offered 1983-84.

Hours to be arranged. Staff.

Introduction to the use of the computer as a tool in the architectural design process. Experience with computer applications will be offered.]

**431 Theory of Architecture** Fall. 3 credits.  
Prerequisite: third-year status.

Lecs, T R 4:40-6:30. L. F. Hodgden.

Urban form, urban intervention, and contextualism: historic new towns, streets, piazzas, social housing. Gardening and architecture: urban parks; villas and country houses; Italian, French, and English landscape gardens. Site planning.

**435 Architecture and Re-presentation** Fall. 3 credits. Limited to degree candidates in architecture. Prerequisite: successful completion of Architecture 231-232.

Lecs, disc, and reviews, T R 2:30-4:30. V. Warke.

A study of architecture as it functions as a re-presentational art, referring to its past while inferring its present. Investigations this semester will center on issues of the vertical surface.

**437-438 Special Projects in Computer Graphics** 437, fall; 438, spring. Variable credit. Limited to third-year students and above. Prerequisites: Architecture 334 plus concurrent registration in Computer Science 314 or equivalent, and permission of instructor.

Hours to be arranged. D. P. Greenberg.

Advanced work in computer graphics input and display techniques, including storage tube, dynamic vector, and color raster displays.

**[531-532 Computer-aided Structural Design]**

531, fall; 532, spring. 4 credits each term. Limited to fourth-year students and above. Prerequisites: Architecture 334 and Civil and Environmental Engineering 371-372, concurrent registration in Civil and Environmental Engineering 673, and permission of instructor. Not offered 1983-84.

D. P. Greenberg.

Advanced topics involving interactive computer graphics and advanced structural analysis techniques.]

**[533-534 Computer-aided Environmental Design]**

533, fall; 534, spring. 4 credits each term. Limited to students in their fourth or later year. Prerequisites: Architecture 334, 362, one year of college physics, and permission of instructor. Not offered 1983-84.

Staff.

Advanced topics involving interactive computer graphic and advanced environmental design techniques. Topics may include acoustics, lighting, and energy analyses.]

**[635 Critical Theory in Architecture]** Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered 1983-84.

Hours to be arranged. Staff.

An inquiry into the fundamental principles of architectural criticism in theory and practice, with emphasis on the philosophical problems involved.]

**637 Special Investigations in the Theory of Architecture II** Fall or spring. Variable credit.  
Prerequisite: permission of the instructor.

Hours to be arranged. Staff.

Independent study.

**[639 Principles of Design Process]** Fall. 3 credits. Limited to third-year architecture students and above; students in other colleges must have permission of instructor. Not offered 1983–84.

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.]

**Note 667–668 Architecture in Its Cultural**

**Context I and II** is accepted as a theory course. See the section "Architectural Science and Technology Courses" for description.

## Architectural History

The history of the built environment 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 two additional courses from the 380–390 series (except for Architecture 395), preferably in the third or fourth year. 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 that of the west, are studied in special offerings as opportunities in faculty resources become available.

### Sequence Courses

**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.

Hours to be announced. Staff.

The history of the built environment as social and cultural expression in western civilization from earliest times to the present. In the fall, themes, theories, and ideas in architecture and urban design are considered, based on selected instances from Mesopotamia to the seventeenth century.

**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.

Hours to be announced. M. Kubelik, staff.

The history of the built environment as social and cultural expression in western civilization from earliest times to the present. In the spring, themes, theories, and ideas are addressed in greater detail for architecture and urban design from the eighteenth century to the 1980s.

### Nonsequence Courses

The schedule of offerings for the Architecture 381–399 series is noted individually for each course.

**[381 Architecture of the Classical World]** Spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered 1983–84; next offered 1984–85.

Hours to be arranged. M. Kubelik.

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.]

**382 Architecture of the Middle Ages** Spring. 4 credits. (Credit for this course may be obtained by taking History of Art 332.) Prerequisites: Architecture 181–182 or permission of instructor.

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.

**384 The Renaissance** Fall. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor.

Hours to be announced. M. Kubelik.

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.

**[385 The Baroque]** 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered 1983–84; next offered spring 1985.

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.]

**[387 The Nineteenth Century]** 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year; next offered fall 1984 and spring 1986.

Hours to be announced. A. Senkevitch, Jr.

Examination of the leading trends in Western architectural theory and practice from the rationalist traditions through the arts-and-crafts movement.]

**388 The Twentieth Century** Spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Next offered fall 1985.

Hours to be announced. Staff.

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 1980s.

**390 American Architecture I** Fall. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of the instructor. Next offered 1985–86.

Hours to be announced. A. Senkevitch, Jr.

History of American architecture and urbanism from the late seventeenth century to the Civil War, with emphasis on stylistic trends, practitioners, and social and aesthetic ideals of the time.

**391 American Architecture II** Spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Next offered 1985–86.

Hours to be announced. A. Senkevitch, Jr.

A continuation of Architecture 390, but may be taken independently. The history of American architecture and urbanism from the Civil War to 1960. 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.

**393 The American Planning Tradition (also City and Regional Planning 462)** Fall. 4 credits. Prerequisites: Architecture 181–182 or permission of instructor.

Hours to be announced. J. W. Reps.

A systematic review of American city planning history, beginning with the earliest colonial settlements and ending with the era of the New Deal. An introductory lecture course requiring no previous exposure to planning or architecture, and a prerequisite for students intending to take advanced seminars or independent studies in planning history.

**394 Russian Architecture** Spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor.

Hours to be announced. A. Senkevitch, Jr.

A survey of leading developments in Russian architecture and urbanism from the tenth to the mid-twentieth centuries, with a consideration of precedents and parallel tendencies abroad.

**395 Special Investigations in the History of Architecture** Fall or spring. Variable credit.

Prerequisite: permission of instructor.

Hours to be announced. Staff.

Independent study for undergraduate students. May not be taken to satisfy undergraduate history requirements by students in design.

**[396 Special Topics in Architectural History]** Spring. 3 credits. Limited to 30 students.

Prerequisites: Architecture 181–182 or permission of instructor. Not offered 1983–84; next offered 1985–86.

Hours to be announced. M. Kubelik.

Topic to be announced by preregistration.]

**[397 Special Topics in Architectural History]** Fall. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered 1983–84.

Hours to be announced. C. F. Otto.

Topic to be announced by preregistration.]

**[398 Special Topics in Architectural History]** Spring. 3 credits. Limited to 30 students.

Prerequisites: Architecture 181–182 or permission of instructor. Not offered 1983–84; next offered 1984–85.

Hours to be announced. A. Senkevitch, Jr.

Topic to be announced by preregistration.]

**399 Special Topics in Architectural History** Fall or spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor.

Hours to be announced. Staff.

Topic to be announced by preregistration.

### Courses in Preservation

**542 Methods of Archival Research (also City and Regional Planning 461)** Spring. 3 credits.

Hours to be announced. K. C. Parsons.

Examination of methods of using archival materials, including documents in the Cornell archives and regional history collections, for research in the history of architecture, historic preservation, and urban development.

**543 Measured Drawing** 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.

**544 Problems in Contemporary Preservation Practice (also City and Regional Planning 563)** Fall or spring. Variable credit.

Hours to be announced. S. W. Stein, M. A. Tomlan, T. Werbizky.

A review and critique of ongoing preservation projects and an investigation of areas of expertise currently being developed, presented by staff and guest lecturers.

**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.

**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.

**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.

**548 Historic Preservation Planning Workshop: Surveys and Analyses (also City and Regional Planning 561)** Fall and spring. 4 credits.

Hours to be announced. T. Werbizky.

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**

**681 Seminar in the Architecture of the Classical World** Fall or spring. 4 credits. Prerequisites:

Architecture 381 or permission of instructor.

Hours to be announced. M. Kubelik.

Issues in Greek and Roman architectural history. Specific topic to be announced.

**684 Seminar in the Renaissance** Fall or spring.

4 credits. Prerequisites: Architecture 384 or permission of instructor.

Hours to be announced. M. Kubelik.

Issues in European architecture and city planning of the fifteenth and sixteenth centuries. Specific topic to be announced.

**685 Seminar in the Baroque** Fall or spring.

4 credits. Prerequisites: Architecture 385 or permission of instructor.

Hours to be announced. Staff.

Special topics in the history of European architecture and urban design between 1600 and 1800. Specific subject to be announced.

**687 Seminar in Nineteenth-Century Architecture**

Fall or spring. 4 credits. Prerequisites: Architecture 387 or permission of instructor.

Hours to be announced. A. Senkevitch, Jr.

Historical topics in European architecture and urbanism in the nineteenth century. Specific subject to be announced.

**688 Seminar in Twentieth-Century Architecture**

Fall or spring. 4 credits. Prerequisites: Architecture 388 or permission of instructor.

Hours to be announced. Staff.

Special topics in the history of architecture and urban design in Europe and America during the twentieth century. Specific subject to be announced.

**690 Seminar in American Architecture** Fall or

spring. 4 credits. Prerequisites: Architecture 390–391 or permission of instructor.

Hours to be announced. A. Senkevitch, Jr.

Historical topics in the architecture of the nineteenth and twentieth centuries in the United States. Specific subject to be announced.

**693 Seminar in the History of American City Planning (also City and Regional Planning 660)**

Spring. 3 credits. Prerequisites: Architecture 393 or permission of instructor.

Hours to be announced. J. W. Reps.

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.

**694 Seminar in Russian Architecture** Fall or

spring. 4 credits. Prerequisites: Architecture 394 or permission of instructor.

Hours to be announced. A. Senkevitch, Jr.

Historical topics in Russian architecture and urbanism. Specific subject to be announced.

**696 Seminar in the History of Architecture and Urban Development** Fall or spring. 4 credits.

Prerequisites: permission of the instructor.

Hours to be announced. M. Kubelik.

Topic to be announced.

**697 Seminar in the History of Architecture and Urban Development** Fall or spring. 4 credits.

Prerequisite: permission of instructor.

Hours to be announced. Staff.

Topic to be announced.

**698 Seminar in the History of Architecture and Urban Development** Fall or spring. 4 credits.

Prerequisite: permission of the instructor.

Hours to be announced. A. Senkevitch, Jr.

Topic to be announced.

**699 Seminar in the History of Architecture and Urban Development** Fall or spring. 4 credits.

Prerequisite: permission of the instructor.

Hours to be announced. Staff.

Topic to be announced.

**790 Informal Study in the History of Architecture and Urban Development** Fall or spring. Variable

credit. Prerequisite: permission of the instructor.

Hours to be announced. Staff.

Independent study for graduate students.

**890 Thesis in Architectural History** Fall or spring.

Variable credit.

Hours to be announced. Staff.

Independent study for the master's degree.

**990 Dissertation in Architectural History** Fall or

spring. Variable credit.

Hours to be announced. Staff.

Independent study for the doctoral degree.

**Design Communication Courses**

**Sequence Courses**

**151 Design Fundamentals I** Fall. 2 credits.

Studio and lec. R 2–6. Staff.

Fundamentals of visual and conceptual organization.

Dynamics of perception; spatial organization and its representation. Demonstrative problems of an analytic and conceptual nature.

**152 Design Fundamentals II** Spring. 2 credits.

Studio and lec. R 2–6. Staff.

Theory of visual and conceptual organization, spatial perception, spatial organization and its representation; demonstrative problems of an analytic and conceptual nature.

**Nonsequence Courses**

*Note:* Darkroom fees for all photography courses (these fees are subject to change):

In-college students—\$45 per term

Out-of-college students—\$45 plus \$10 per term course fee

**251 Introductory Photo I (also Art 161 or 162)**

Fall or spring. 3 credits each term.

Hours to be arranged. Staff.

For course description, see Art 161–162.

**351 Introductory Photo II (also Art 261 or 262)**

Spring. 3 credits. Prerequisites: Architecture 251 or Art 161 or 162, or permission of instructor.

Hours to be arranged. Staff.

For course description, see Art 261–262.

**[353 Large-Format Architectural Photography]**

Spring. 3 credits. Prerequisites: Architecture 251 or Art 161–162, 261–262, or permission of instructor.

Darkroom fee, \$30. Not offered 1983–84.

Lec and studio, hours to be arranged. Staff.

The special uses of large-format view camera photography. Emphasis on the creative use of the view camera in architectural photography.]

**355 Graphic Design Studio** Fall or spring.

3 credits. Prerequisite: Architecture 151, 152, or permission of instructor.

Lec and studio, hours to be arranged. Staff.

Design and preparation of materials for reproduction in print media. Studio in typography, available printing processes, and photomechanical methods of reproduction.

**[356 Architectural Simulation Techniques]**

Spring. 3 credits. Prerequisite: Architecture 151 or permission of instructor. Not offered 1983–84.

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.]

**457 Special Project in Photography** Fall or

spring. Variable credit. Prerequisites: written proposal outlining the special project and permission of instructor.

Hours to be arranged. Staff.

Independent study.

**458 Special Project in Design Communication**

Fall or spring. Variable credit. Limited to undergraduates. Prerequisite: written proposal

outlining the special project and permission of instructor.

Hours to be arranged. Staff.

Independent study. Students taking course for photography credit pay darkroom fee.

**Architectural Science and Technology Courses**

**Sequence Courses**

**162 Introduction to Social Sciences in Design**

Spring. 2 credits.

Lecs, M W F 9:05. B. MacDougall.

An introduction to concepts and methods in the social sciences for architects; how approaches from anthropology, environmental psychology, and sociology can be used in the study and design of the built environment.

**261 Environmental Controls—Site Planning** Fall

or spring. 3 credits.

Lecs, M W F 11:15. Staff.

The basic principles involved in design in the outdoor environment. A brief historical perspective including Italian, French, and Japanese prototypes. A development of inventory, design, and graphic communication tools and conventions. Grading, runoff, and planting design. Special attention is placed on the design of the microclimate.

**262 Building Technology, Materials, and**

**Methods** Fall or spring. 3 credits

Lecs, M W 11:15–1:10. Staff.

Properties of materials—their use and application to the design of buildings and building systems. Discussion of various methods of building construction and assembly.

**361 Environmental Controls—Lighting and Acoustics**Fall or spring. 3 credits each term.  
Lecs, M W F 10:10. 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.

**362 Environmental Controls—Mechanical and Passive Solar Systems**Fall or spring. 3 credits each term.  
Lecs, M W 10:10. Staff.  
Basic thermal analysis of buildings, human comfort criteria, energy conservation, passive solar design, HVAC distribution systems, overview of mechanical conveying systems and plumbing.**Nonsequence Courses****371 Environmental Technology Workshop I**Fall. 2 credits.  
Studio, hours to be arranged. Staff.  
The mechanical engineer's task and its relation to the architectural design process. Full-scale and model studies of the role of air movement and temperature in building design. Passive and active solar energy design.**372 Environmental Technology Workshop II**Spring. 2 credits. Prerequisite or corequisite: Architecture 362.  
Studio, hours to be arranged. Staff.  
The tasks of the acoustical consultant, the electrical engineer, and the illumination consultant in relation to the architect's work. Acoustical and lighting design studies using full-scale mock-ups and specific building type studies. Cost factors.**561 Special Problems in Architectural Science**Fall or spring. Variable credit. Prerequisite: permission of science staff instructor.  
Hours to be arranged. Staff.  
Independent study.**[563 Energy-Efficient Microclimate Design]**Fall. 3 credits. Not offered 1983–84.  
Hours to be arranged. Staff.]**[564 Earth-sheltered Architecture]**Spring. 3 credits. Not offered 1983–84.  
Hours to be arranged. Staff.]**662 Environmental Control Systems**Spring. 3 credits. Prerequisite: Architecture 362.  
Lec and sem, hours to be arranged. Staff.  
The influences of the environment on the design of buildings and urban developments. Lecture and workshop exercises use the wind tunnel and artificial sun.**667–668 Architecture in Its Cultural Context I and II**667, fall; 668, spring. 4 credits each term.  
Prerequisite: permission of instructor.  
Sem, M W F 11:15. 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.**Graduate Courses****761–762 Architectural Science Laboratory**761, fall; 762, spring. Variable credit. Open to graduate students only.  
Hours to be arranged. Staff.  
Projects, exercises, and research in the architectural sciences.**763–764 Thesis or Research in Architectural Science**763, fall; 764, spring. Variable credit.  
Limited to graduate students.  
Hours to be arranged.  
Independent study.**The Profession of Architecture****Sequences Courses****481 Professional Practice**Fall or spring. 3 credits each term.  
T 1:25–4:25. Staff.  
An examination of organizational and management theories and practices for delivering professional design services. Included are an assessment of the building industry and its influence on practice; an analysis of the basic management functions within professional firms; and the legal concerns facing practitioners today. Sessions with selected guest participants focus on case studies.**Architectural Drawing****191 Drawing I**Fall. 2 credits.  
Studios, T R 9:05–11. Staff.  
Freehand drawing with emphasis on line and perspective representation of form and space.**192 Drawing II**Spring. 2 credits. Prerequisite: Architecture 191.  
Studios, T R 9:05–11. Staff.  
Freehand drawing as a means of conceiving and expressing spatial form; line weight, shades and shadows, and figure drawing.**Art**

S. Bowman, chairman; R. Bertoia, Z. Blum, N. D. Daly, J. Locey, E. Meyer, E. Mikus, G. Page, S. Poleskie, J. Seley, A. Singer, J. L. Squier, 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 fourth 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 upon 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.

**Curriculum****First Year**

<i>Fall Term</i>	<i>Credits</i>
110 Color, Form, and Space	3
111 Introductory Art Seminar	1
121 Introductory Painting	3
141 Introductory Sculpture	3
151 Introductory Drawing	3
Elective	3
minimum	16

**Spring Term**

One of the following:	3
132 Introductory Etching	
134 Introductory Graphics	
136 Introductory Lithography	
152 Introductory Drawing	3
162 Introductory Photography	3
Art history elective	3
Elective	3
minimum	15

**Second Year**

<i>Fall Term</i>	
251 Second-Year Drawing	3
100- or 200-level studio courses*	6
Art history elective	3
Elective	3
minimum	15

**Spring Term**

252 Second-Year Drawing	3
100- or 200-level studio courses*	6
Art history elective	3
Elective	3
minimum	15

**Third Year**

<i>Fall Term</i>	
Third-year studio concentration	4
Studio elective	2
311 Issues of Contemporary Art	3
Electives	6
minimum	15

**Spring Term**

Either third-year studio or independent studio or both	6
Art history elective	4
Electives	6
minimum	16

**Fourth Year**

<i>Fall Term</i>	
Fourth-year studio concentration	6
Art history elective	4
Electives	6
minimum	16

**Spring Term**

Senior thesis studio concentration	6
Art history elective	4
Electives	6
minimum	16

\*Students must complete one course each in painting, sculpture, printmaking, and photography during the second year.

**Third and fourth years.** Students in the third and fourth years should plan their programs to complete 30 credits in courses in one of the following studio areas: painting, sculpture, printmaking, or photography. Or they should plan to complete 20 credits in each of two of the above areas. An additional 12 credits in history of art at the 200 level or higher or in architectural history must also be completed. Students are required to participate in Senior Exhibition.

The B.F.A. program is designed so that students may fulfill the degree requirements of 130 credits with a minimum of 64 credits taken in the Department of Art and a minimum of 50 credits taken outside the department. Within these ranges, students may design their own programs subject to the following limitations:

1) Of the minimum of 50 elective credits to be taken outside the Department of Art, 12 credits must be in English, history, or other humanities offered in the College of Arts and Sciences. In the first two years 9 credits in history of art at the 200 level or higher or in architectural history must be completed. An additional 12 credits in art history at the 200 level or higher or in architectural history must be completed in the last two years. The following courses in the Department of History of Art must be completed: 220, The Classical World; 230, Monuments of Medieval Art; 240, The Renaissance; 261, Modern Art. Three of the following should be taken: History of Art 250, 270, 280, 290, 322, 323, 329, 341, 343, 344, 345, 352, 355, 357, 361, 362, 364, 365, 376, 379, 380, 381, 383, 384, 385, 386; Architecture (history) at the 100, 200, 300 or 400 level.

2) Of the minimum of 64 credits to be taken within the Department of Art, the following courses must be completed in the first two years: 110, 111, 121, 141, 151, 152, 162, 221 or 222, 241 or 242, 251 or 252. One of the following photography courses must be completed in the second year: 261, 262, 263, 264, 265, 266, 267, 268. In addition, two of the following courses in the printmaking area must be completed in the first two years: 131, 132, 133, 134, 135, 136, 231, 232, 233, 234, 235, 236.

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.

## 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 \$20 each semester. Students from outside the department are charged \$10 a course.

## Courses in Theory and Criticism

**110 Color, Form, and Space** Fall, spring, or summer. 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.

**111 Introductory Art Seminar** Fall. 1 credit.  
Limited to B.F.A. candidates.  
F 1:25–3.

Students meet for one hour each week with a different member of the faculty. The varying artistic interests of the staff are presented and discussed.

**311 Issues in Contemporary Art** Fall.  
Prerequisite: third-year standing in Fine Art Program.  
Hours to be arranged. S. Poleskie.  
A seminar course in issues of contemporary art, including lectures by visiting artists.

**610 Seminar in Art Criticism** Fall or spring.  
2 credits. May be repeated for credit. Four terms required for M.F.A. candidates. Open to other graduate students.  
Hours to be arranged. Staff.  
Historical and modern critical opinions and their relation to problems in the theory of art are studied.

## Studio Courses in Painting

**121–122 Introductory Painting** 121, fall or summer; 122, spring. 3 credits each term.  
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.

**221–222 Second-Year Painting** 221, fall; 222, spring. 3 credits each term. Prerequisite: Art 121 or 122 or permission of instructor.  
Hours to be arranged. Staff.  
Study of traditional and contemporary media.

**321 Third-Year Painting** Fall. 4 credits.  
Prerequisite: Art 222 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.

**322 Third-Year Painting** 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.

**421 Fourth-Year Painting** 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.

**422 Senior Thesis in Painting** Spring. 6 credits  
Prerequisite: Art 421 or permission of instructor.  
Hours to be arranged. Staff.  
Advanced painting project to demonstrate creative ability and technical proficiency.

**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

**131–132 Introductory Intaglio Printing** 131, fall; 132, spring or summer. 3 credits each term.  
Hours to be arranged. E. Meyer.  
A basic introduction to etching techniques, with emphasis on engraving, lift ground, relief printing, monotypes, and experimental techniques.

**133–134 Introductory Graphics** 133, fall; 134, spring. 3 credits each term.  
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.

**135–136 Introductory Lithography** 135, fall; 136, spring. 3 credits each term.  
Hours to be arranged. G. Page.  
The theory and practice of planographic, utilizing limestone block and aluminum plate. Basic lithographic techniques of crayon, wash, and transfer art are studied.

**231–232 Second-Year Intaglio Printing** 231, fall; 232, spring. 3 credits each term. Prerequisite: Art 131 or 132 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.

**233–234 Second-Year Silk-Screen Printing** 233, fall; 234, spring. 3 credits each term. Prerequisite: Art 133 or 134 or permission of instructor.  
Hours to be arranged. S. Poleskie.  
Continuation of silk-screen printing, including photographic stencils, three-dimensional printing, and printing on metal, plastic, and textiles.

**235–236 Second-Year Lithography** 235, fall; 236, spring. 3 credits each term. Prerequisite: Art 135 or 136 or permission of instructor.  
Hours to be arranged. G. Page.  
Continuation of the study and practice of planographic printing, with emphasis on color.

**331 Third-Year Printmaking** Fall. 4 credits.  
Prerequisite: 9 credits of course work in an area of specialization (intaglio, lithography, or silk-screen printing) 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.

**332 Third-Year Printmaking** Spring. 4 credits  
Prerequisite: Art 331 or permission of instructor.  
Hours to be arranged. Staff.  
Continuation and expansion of Art 331.

**431 Fourth-Year Printmaking** Fall. 6 credits.  
Prerequisites: Art 331–332 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.

**432 Senior Thesis in Printmaking** Spring. 6 credits. Prerequisite: Art 431 or permission of instructor.  
Hours to be arranged. Staff.  
Advanced printmaking project to demonstrate creative ability and technical proficiency.

**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

**141–142 Introductory Sculpture** 141, fall or summer; 142, spring. 3 credits each term.

Hours to be arranged. Staff.

A series of studio problems introduce the student to the basic considerations of artistic expression through three-dimensional design. Modeling in Plasteline, building directly in plaster, and casting in plaster.

**241–242 Second-Year Sculpture** 241, fall; 242, spring. 3 credits each term. Prerequisites: nonmajors, none; majors, Art 141 or 142 or permission of instructor.

Hours to be arranged. Staff.

Various materials including clay, plaster, wood, and stone are used for exercises involving figurative modeling, abstract carving, and other aspects of three-dimensional form and design.

**341 Third-Year Sculpture** Fall. 4 credits. Prerequisite: Art 242 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.

**342 Third-Year Sculpture** Spring. 4 credits. Prerequisite: Art 341 or permission of instructor.

Hours to be arranged. Staff.

Continuation and expansion of Art 341.

**441 Fourth-Year Sculpture** 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.

**442 Senior Thesis in Sculpture** Spring. 6 credits. Prerequisite: Art 441 or permission of instructor.

Hours to be arranged. Staff.

Advanced sculpture project to demonstrate creative ability and technical proficiency.

**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

*Note:* Darkroom fees for all photography courses (these fees are subject to change):

In-college students—\$45 per term

Out-of-college students—\$45 plus \$10 per term course fee.

**161–162 Introductory Photo I (also Architecture 251)** 161, fall or summer; 162, spring. 3 credits each term. Darkroom fee, \$45 (may increase).

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.

**261–262 Introductory Photo II (262 is also Architecture 351)** 261, fall; 262, spring. 3 credits. Prerequisites: Art 161 or 162, Architecture 251 or 252, or permission of instructor. Darkroom fee \$45 (may increase).

Hours to be arranged. Staff.

A continuation of Introductory Photo I.

**263–264 Color Photo I** 263, fall; [264, spring]. 3 credits each term. Prerequisite: Art 161 or 162 or permission of instructor. Darkroom fee \$45 (may increase). Not offered spring 1984.

Hours to be arranged. S. Bowman.

A studio course in color photographic processes, including color film developing and color printing. Emphasis is on camera skill, color techniques, image content, and creative use of color photography.

**[265–266 Color Photo II** 265, fall; 266, spring 3 credits each term. Prerequisite: Art 263 or 264 or permission of instructor. Darkroom fee \$45 (may increase). Not offered 1983–84.

Hours to be arranged. S. Bowman.

A continuation of Color Photo I.]

**267–268 Photo Processes** [267, fall]; 268, spring. 3 credits each term. Prerequisite: Art 161 or 162 or permission of instructor. Darkroom fee \$45 (may increase). Not offered fall 1983.

Hours to be arranged. J. Locey.

A studio course in photo and nonsilver processes. Emphasis is on camera skill, basic techniques and processes, image content, and creative use of photo processes.

**[269 Large-Format Photography** Fall. 3 credits. Prerequisite: Art 161 or 162 or permission of instructor. Darkroom fee \$45 (may increase). Not offered 1983–84.

Hours to be arranged. Staff.

A studio course in the use of large-format cameras, with emphasis on technique and creative use of materials and equipment.]

**361–362 Third-Year Photography** 361, fall; 362, spring. 4 credits each term. A studio course intended for photography majors and other qualified students. Prerequisite: One 200-level photography course or permission of instructor.

Hours to be arranged. Staff.

Continued study of creative use of photography, with emphasis upon specialized individual projects.

**461 Fourth-Year Photography** Fall. 6 credits. Prerequisite: three semesters of photography or permission of instructor. Darkroom fee, \$45 (may increase).

Hours to be arranged. J. Locey.

A studio course intended for photography majors and other qualified students.

**462 Senior Thesis in Photography** Spring. 6 credits. Prerequisite: Art 461 or permission of instructor.

Hours to be arranged. S. Bowman.

A studio course intended for photography majors and other qualified students. Advanced photography project to demonstrate creative ability and technical proficiency.

**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.

## Studio Courses in Drawing

**151–152 First-Year Drawing** 151, fall or summer; 152, spring. 3 credits each term.

Hours to be arranged. Staff.

A basic drawing course in the study of form and techniques. Contemporary and historical examples of figure drawing are analyzed in discussion.

**251–252 Second-Year Drawing** 251, fall; 252, spring. 3 credits each term. Prerequisites: Art 151 or 152, 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.

**[351 Third-Year Drawing** Fall. 3 credits. Prerequisites: Art 151, 152, 251, and 252. Not offered 1983–84. Staff.]

## Graduate Thesis

**712 Graduate Thesis** Spring. Credit as assigned. Staff.

For graduate students in their last term in the programs in painting, sculpture, and graphics.

## Special Studio Courses

**370 Independent Studio in Painting** Fall or spring. Credit as assigned up to 5 credits; may be repeated for credit. Prerequisite: written permission of instructor.

Hours to be arranged. Staff.

Advanced studio concentration in painting.

**371 Independent Studio in Sculpture** Fall or spring. Credit as assigned up to 5 credits; may be repeated for credit. Prerequisite: written permission of instructor.

Hours to be arranged. Staff.

Advanced studio concentration in sculpture

**372 Independent Studio in Printmaking** Fall or spring. Credit as assigned up to 5 credits; may be repeated for credit. Prerequisite: written permission of instructor.

Hours to be arranged. Staff.

Advanced studio in printmaking.

**373 Independent Studio in Photography** Fall or spring. Credit as assigned up to 5 credits; may be repeated for credit. Prerequisite: written permission of instructor.

Hours to be arranged. Staff.

Advanced studio concentration in photography.

**374 Independent Studio in Drawing** Fall or spring. Credit as assigned up to 5 credits; may be repeated for credit. Prerequisite: written permission of instructor.

Hours to be arranged. Staff.

Advanced studio concentration in drawing

**470 Independent Studio in Painting** Fall or spring. Credit as assigned up to 6 credits; may be repeated for credit. Prerequisite: written permission of instructor.

Hours to be arranged. Staff.

Advanced studio concentration in painting.

**471 Independent Studio in Sculpture** Fall or spring. Credit as assigned up to 6 credits; may be repeated for credit. Prerequisite: written permission of instructor.

Hours to be arranged. Staff.

Advanced studio concentration in sculpture.

**472 Independent Studio in Printmaking** Fall or spring. Credit as assigned up to 6 credits; may be repeated for credit. Prerequisite: written permission of instructor.

Hours to be arranged. Staff.

Advanced studio concentration in printmaking.

**473 Independent Studio in Photography** Fall or spring. Credit as assigned up to 6 credits; may be repeated for credit. Prerequisite: written permission of instructor.

Hours to be arranged. Staff.

Advanced studio concentration in photography.

**474 Independent Studio in Drawing** Fall or spring. Credit as assigned up to 6 credits; may be repeated for credit. Prerequisite: written permission of instructor.

Hours to be arranged. Staff.

Advanced studio concentration in drawing.

## City and Regional Planning

S. Saltzman, chairman; R. S. Booth, P. Brandford, P. Clavel, S. Czamanski, J. F. Forester, W. W. Goldsmith, B. G. Jones, D. B. Lewis, D. W. Nelkin, K. C. Parsons, J. W. Repps, S. W. Stein, I. R. Stewart, M. A. Tomlan, T. Werbizky

The department offers programs of study at both the undergraduate and graduate levels. The undergraduate degree program is focused on urban and regional studies. The graduate program is focused on urban and regional planning.

### The Undergraduate Program in Urban and Regional Studies

The program offers students completing their first two years in areas of study such as social sciences, design, the humanities, engineering, and other fields an opportunity to transfer and redirect their education toward an understanding of the various social, political, economic, and environmental issues facing cities and regions. The focus of study is primarily academic rather than professional. The curriculum is designed to develop an understanding of the complex process of urbanization that characterizes modern society, and the various forces that most affect the growth or decline of cities and regions. For further information, students should consult the director of the Urban and Regional Studies Program, 106 West Sibley Hall.

### The Graduate Program in City and Regional Planning

Planning seeks to guide the development of the economic, social, natural, and built environments in order that some of the needs and aspirations of people may be better satisfied. Most of the activities in the program focus on a broad range of issues that are often subsumed under the labels of urban, regional, or social-policy planning. There is clearly a considerable overlap among these three areas of professional and scholarly study, and the department encourages the integration of related planning activities.

**Urban planning** is generally concerned with the urban environment, the physical facilities as well as social and economic forces that affect this environment, and the processes of urban plan making and administration.

**Regional planning** is usually 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 in regional development.

**Social-policy planning** is generally concerned with the social decision processes involved in both city and regional planning.

**International planning** is an additional area in which the department offers a range of courses and activities that involve United States citizens and foreign nationals.

### 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.

There are two components to city and regional planning course numbers: (a) Courses numbered from 500–599 and 600–699 are generally considered to be introductory or first-year courses; those numbered from 700–799 and 800–899 are generally considered to be more advanced courses. Upperclass undergraduate courses are numbered from 300–499. (Undergraduates with the necessary

prerequisites and permission of the instructor may enroll in courses numbered 500 and above.); (b) Courses are grouped (by the tens digit of the course number) to represent the underlying structure of the planning curriculum as follows: theory and quantitative methods (0, 1, 2), program areas (3, 4, 5), and interprogram topics (6, 7, 8, 9).

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 the latest changes.

### Urban and Regional Theory

**400 Introduction to Urban and Regional Theory** Fall. 4 credits. Open to juniors and seniors. T 2:30–5:30. Staff.

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.

**402 Spatial Analysis of Urban and Regional Systems I** Fall. 4 credits

Staff.  
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.

**403 Spatial Analysis of Urban and Regional Systems II** Spring. 4 credits. Prerequisite: CRP 402. Staff.

A detailed, in-depth 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.

**404/600 Urban Economics** Fall. 4 credits. Prerequisite: basic economics.

T 10:10–12:05, plus optional workshops.  
S. Czamanski.  
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.

**500 Urban and Regional Theory** Spring. 4 credits. Prerequisites: intermediate-level economics or sociology or CRP 400.

W. W. Goldsmith.  
Material from economics, sociology, and geography explains the location, size, form, and functioning of cities. A review of conflicting theories allows examination of the contemporary city and its problems. Major texts will be read, criticized, and discussed in seminars.

**708 Fieldwork or Workshop in Urban and Regional Theory** Fall or spring. Credit as assigned. Staff.

Work on problems in urban and regional theory in a field or laboratory setting or both.

**709 Special Topics in Urban and Regional Theory** Fall or spring. Credit as assigned. Staff.

**800 Advanced Seminar in Urban and Regional Theory I** Fall. 3 credits. Prerequisite: CRP 500.

M 3:35–5:30. 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.

**801 Advanced Seminar in Urban and Regional Theory II** Spring. 3 credits. Prerequisite: CRP 800. M 3:35–5:30. B. G. Jones.

A continuation of City and Regional Planning 800, concentrating on recent developments.

**809 Informal Study in Urban and Regional Theory** Fall or spring. Credit as assigned. Staff.

### Planning Theory and Politics

**411 Introduction to Planning** Fall. 4 credits  
P. Clavel and staff.

The origins, history, programs, and contemporary issues of city and regional planning in the United States. Conceptions of the state, the role of planners in public action, and the dominant methods and values of planners are discussed and criticized.

**413 Planning and Political Economy I** Fall 4 credits.  
Staff.

This course deals with Marx's methodological approach and his elaborations in volume one of *Capital*. Topics will cover Marx's method, labor theory of value, labor-process and surplus-value, absolute and relative surplus-value, general law of capital accumulation, and transition from feudalism to capitalism. Basic texts will be supplemented with readings and discussion about current urban problems.

**414 Planning and Political Economy II** Spring. 4 credits. Prerequisites: students must have read volume one of *Capital* and be generally familiar with Marx's approach.  
Staff.

Introduction to volumes two and three of Marx's *Capital* and his *Theories of Surplus Value*. Discussion of selected topics among the circulation of capital, productive and unproductive labor, reproduction schemes, accumulation, the transformation of surplus-value into profits, the transformation of values into prices of production, the tendency of the rate of profit to fall, and crises. Emphasis on interpretation of current urban problems.

**510 Introduction to Planning Theory** Spring. Credit as assigned.  
Staff.

Normative and behavioral models of decision making for the provision of public goods and services. Theories of individual decision and choice are reviewed, followed by applications in institutional contexts stressing the impact of alternative organizational and political models of social decision processes.

**511 Concepts and Issues in Planning Practice** Fall. Credit as assigned.  
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. Interrelationships between national, state, and local practices and policies, and developments in methodology, organization, and the political environment will be explored.

**[614 Neighborhood and Community Theory** Spring. 4 credits. Not offered 1983–84.  
Staff.

An examination of contemporary social and economic conditions of neighborhoods; community differentiation reinvestment and revitalization policies

and practice; community control; and the role of the community in the provision of goods, services, and social support.]

**710 Politics of the Planning Process** Spring 4 credits.

W 2:30–4:25. P. Clavel.  
Analysis of planning and political institutions in selected subjects and policy areas, relating national and subnational levels. Subjects are drawn from such areas as environmental control and use policy, industrial development, transportation, and community development. Theories of planning and politics are compared for their analytical usefulness in these areas.

**711 Planning and Organization Theory** Fall 4 credits.

R 3:35–5:30. P. Clavel.  
An examination of organizational and administrative models relevant to plan formation and implementation. Applications are made to such programs as community development, regional administration, urban renewal, and land-use control.

**718 Fieldwork or Workshop in Planning Theory and Politics** Fall or spring. Credit as assigned. Staff.

Work on problems in planning theory and politics in a field or laboratory setting or both.

**719 Special Topics in Planning Theory and Politics** Fall or spring. Credit as assigned. Staff.

**810 Advanced Planning Theory** Fall. 3 credits. Prerequisite: CRP 500 or 710.

F 3:35–5:30. 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.

**819 Informal Study in Planning Theory and Politics** Fall or spring. Credit as assigned. Staff.

**Quantitative Methods and Systems Analysis**

**320 Introduction to Quantitative Methods I** 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, mathematical, and computer methods for the formulation, analysis, and testing of hypotheses and models of social, economic, and physical phenomena of cities and regions. Applicable methods in probability, descriptive statistics, estimation, hypothesis testing, prediction, and techniques for decision analysis will be introduced. The use of the computer as an aid in computation and modeling will also be covered in parallel with these methods and techniques.

**321 Introduction to Quantitative Methods II** Spring. 3 credits. Prerequisite: CRP 320 or permission of instructor. Staff.

A continuation of City and Regional Planning 320.

**520 Mathematical Concepts for Planning** Fall. 1–4 credits. Prerequisite: permission of instructor. Mathematics 201 and Sociology 420 are acceptable substitutes for this course.

T R 9:05–11. P. Brandford.  
Intended for students having little or no background in college mathematics. Basic concepts in matrix algebra, calculus, and probability are covered in self-contained units of one credit each. Students may register for any or all of these topics.

**521 Introduction to Computers in Planning** Fall 3 credits. Staff.

An introduction to the use of computers in the problem-solving and planning processes. Students run programs using PL/1 or another appropriate programming language. Brief introduction to computer systems and the use of library routines. Advantages and limitations of using computers are considered.

**620 Planning Analysis** Spring 4 credits. Prerequisite: CRP 621.

M W F 10:10–11:00; lab, T 2:30–4:25. B. G. Jones.  
A survey of commonly used techniques for analyzing various aspects of subnational socioeconomic systems, emphasizing planning applications.

**623 Methods of Social Policy Planning** Spring 3 credits. Prerequisite: CRP 521 or equivalent. Staff.

An examination of methodologies of needs assessment, programming, and evaluation suitable for social planning problems. Many of the methodologies, survey research, social area analysis, and social indicators have been drawn from other social science disciplines but are applied to policy and planning issues. Others, such as needs assessment, social impact assessment, goal attainment, PPBS, and PERT were developed directly or were adapted for use in social planning.

**624 Statistical Analysis for Planning I** Fall. 3 credits. Prerequisites: CRP 520 or equivalent and permission of instructor. Staff.

An introduction to basic methods of statistical analysis with an emphasis on their use in the decision-making process in planning. Material in decision theory, sampling, estimation, hypothesis testing, and prediction will be introduced.

**625 Statistical Analysis for Planning II** Spring. 3 credits. Prerequisite: CRP 624. Staff.

Continuation of CRP 624.

**[720 Quantitative Techniques for Policy Analysis and Program Management** Fall. 4 credits. Not offered 1983–84.

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.]

**[721 Simulation in Planning and Policy Analysis** Fall or spring. 3 credits. Prerequisites: CRP 621 and 521 or equivalent. Not offered 1983–84.

T R 4:40–5:30. S. Saltzman.  
The design and use of simulation models in planning and policy analysis. Various approaches drawn from discrete stochastic simulation, econometric simulation, microanalytic simulation, and urban dynamics are evaluated. Applications in design, land use, regional development, and social policy are considered. Students run their own programs on the Cornell computer.]

**[722 Decision Analysis for Policy Planning and Program Management** Spring. 4 credits. Not offered 1983–84.

D. Lewis.  
An examination of selected techniques for analyzing complex dynamic decision problems in the planning context. Topics include dynamic programming (deterministic and probabilistic), integer programming, and process simulation (queueing models).]

**728 Fieldwork or Workshop in Systems Planning and Analysis** Fall or spring. Credit as assigned. Staff.

Work on applied systems planning problems in a field or laboratory setting or both.

**729 Special Topics in Quantitative Methods and Analysis** Fall or spring. Credit as assigned. Staff.

**829 Informal Study in Quantitative Methods and Analysis** Fall or spring. Credit as assigned. Staff.

**Regional Development Planning**

**[530 Introduction to Regional Development Planning** Fall. 3 credits. Prerequisite: CRP 500. Not offered 1983–84.

Staff.  
An introduction to the history, theories, methods, and processes of regional development planning, which also focuses on specialized planning functions of various public agencies.]

**[630 Regional Development Administration** Fall or spring. 4 credits. Not offered 1983–84.

M 1:25–3:20. P. Clavel.  
Administrative institutions relevant to regional development policies, with attention to the United States, Western Europe, and Third World countries. Approaches to theory, measurement, and spatial distribution of institutions are covered, with emphasis on the design of effective programs.]

**730 Methods of Regional Science** Fall 4 credits. Prerequisites: basic economics and elementary matrix algebra.

R 10:10–12:05, plus optional workshops. S. Czamanski.  
Main quantitative techniques used in regional planning are covered. Since many methods have multiple applications in planning, the topics are organized around three broad subjects: population and migration studies, regional economic analysis, and interindustry relations.

**731 Optimization Techniques in Planning** Spring 4 credits. Prerequisites: basic economics, elementary calculus, and matrix algebra.

T 10:10–12:05, plus optional workshops. S. Czamanski.  
Typology of plans and planning models. Static optimization techniques, especially linear programming, integer and quadratic programming, optimization under competition, and multiobjective planning are discussed in the context of applications to land use, location of public facilities, and regional development. Dynamic systems, including basic control theory, and introduction to dynamic programming with applications to regional growth and migration policies. Economic theory of socialism. Elements of calculus of variations and of geometry of vector spaces are covered in optional workshops.

**732 Regional Industrial Development** Fall. 4 credits. Prerequisites: basic economics and elementary calculus.

W 10:10–12:05, plus optional workshops. S. Czamanski.  
The course focuses on issues of industrial, as distinct from agricultural or regional, development. Material includes theory of production, elements of growth theory, interindustry relations and formation of industrial complexes, locational attractiveness, and interregional flows of goods, services, and factors of production.

**738 Fieldwork or Workshop in Regional Development Planning** Fall or spring. Credit as assigned. Staff.

Work on applied problems in regional development planning in a field or laboratory setting or both.

**739 Special Topics in Regional Development Planning** Fall or spring. Credit as assigned. Staff.

**832 Location Theory in Physical and Policy**

**Spaces** Fall or spring. 3 credits. Prerequisites: CRP 500 and 620 and Economics 311–312, or equivalent. R 7–10 p.m. W. Isard.

Traditional Weberian location doctrine; transport orientation, labor orientation, agglomeration, and urban rent theory are examined in both physical and policy spaces. Interregional trade and market and supply area analysis is treated. Particular attention is paid to Loschian and Christaller systems of urban places, and coalition structures.

**833 Conflict Management in Multiregion**

**Planning** Spring. 3 credits. W. Isard.

Basic elements for the analysis of conflicts among policy makers in multiregion situations are examined. Particular emphasis is given to conflicting objectives among different interest groups, regions, and nations, and diverse procedures to reach compromise solutions are examined. The use of maximizing incremental procedures, game theory, and diverse methods for establishing priorities and cooperative action as well as recursive, interactive approaches to resolve conflict are considered.

**839 Informal Study in Regional Development**

**Planning** Fall or spring. Credit as assigned. Staff

**Social Policy Planning**

**340 Institutional Decision Processes** Fall. Credit as assigned.

W 2:30–4:25. Staff.  
An introduction to the administrative and political environment in which urban and regional issues occur. Starting from an analysis of social decision procedures, the course then goes on to describe the characteristic administrative and political institutions in which issues on urban and regional problems take place; some attention is also given to the underlying dynamics of economic and political development in cities and regions, and the roles that various participants play in these decision processes.

**440 The Impact and Control of Technological Change (also Economics 302 and Government 302)**

Cosponsored by the Program on Science, Technology, and Society. Spring. 4 credits.

T R 2:30–4:25. Staff.  
Social, environmental, and economic implications of technological change in the context of present policies and strategies of control. Several specific cases are considered in detail, followed by investigation of the problems of a modern technological society. Alternative political and economic solutions are explored.

**442 Social and Political Studies of Science (also Sociology 355)**

Spring. 3 credits. W 2:30–4:30. Staff.  
A view of science less as an autonomous activity than as a social and political institution. Focus is on its relationship to government, the media, religion, and education. Drawing from recent controversies, questions of ethics and social responsibility in science, struggles to maintain internal control over research and the teaching of science, and concepts of limits to inquiry are discussed.

**[540 Introduction to Social Policy Planning**

Fall. 4 credits. Not offered 1983–84. Staff.  
The process and politics of providing public services, primarily social services, within the context of changing fiscal and social conditions. Topics include (1) a review of the nature and source of selected social problems and of the present service systems that attempt to meet these needs; (2) an analysis of the inadequacies and problems of this system in the light of changing conditions that affect service delivery, such as fiscal and service disparities, budget retrenchment, and political movements to limit

spending, such as Proposition 13; and (3) an exploration of new forms or alternatives to the existing service delivery systems.]

**541 The Politics of Technical Decisions I (also Government 628 and B&PA NPA 515)**

Cosponsored by the Program on Science, Technology, and Society. Fall. 4 credits. W 2:30–4:25. Staff.

Political aspects of decision making in areas traditionally regarded as technical. Subjects include 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.

**542 The Politics of Technical Decisions II (also Government 629 and B&PA NPA 516)**

Cosponsored by the Program on Science, Technology, and Society. Spring. 4 credits. Prerequisite: CRP 541 or permission of instructors.

Hours to be arranged. Staff.  
A continuation of City and Regional Planning 541, focusing on decision making in several technical policy areas. Students develop individual or group research projects focusing on policy decisions with a significant technical component and considerable public impact.

**543 Planning, Organizing, and Public Service Delivery**

Fall or spring. Credit as assigned. R 10:10–12:05. J. Forester.  
An exploration of planners' roles with special attention to organizational and political contexts of planning and policy analysis efforts. Focus is on communicative dimensions of organizational behavior and planning practice; planning is assessed as an organizing activity extending far beyond technical problem solving.

**544 Dynamics of Social Policy Institutions**

Spring. Credit as assigned. J. Forester.  
Recurring social policy themes are studied: professional power and creation of dependency, political and technical aspects of expertise, organizational and institutional settings of social policy programs and services, problems of professional altruism in service delivery.

**642 Critical Theory and the Foundation of Planning Analysis**

Fall. Credit as assigned. R 10:10–12:05. J. Forester.  
Beginning with Weber, Marx, and Durkheim, the fundamental assumptions, theories, and frameworks structuring planning and policy analyses are explored. Positivist, phenomenological, ordinary language, and critical perspectives are considered as they clarify or obscure questions of value, rationality, objectivity, interpretation, and action in public policy contexts.

**643 Legal Aspects of Public Administration**

Fall. 3 credits. M W F 11:15–12:05. R. Booth.  
Examination of basic legal issues that commonly arise in the administration of government agencies, including, for example, agency rule making, protection of individual rights in administrative processes, and judicial review of agency decisions. The course is designed for persons interested in professional careers that will involve working in or with public agencies.

**740 Seminar in Social Policy Research and Analysis**

Spring. 4 credits. Staff.  
Focuses on examining contemporary methods of social policy analysis, including their political implications, and developing multidisciplinary approaches to selected social policy issues. The dilemmas of action research and of implementing research findings are explored.

**743 Critical Theory and Public Policy**

Spring. 4 credits. Prerequisite: background in political or social theory. M 1:25–3:20. J. Forester.  
This seminar explores the critical theory of Jurgen Habermas, particularly its application to problems of planning and public policy analysis. We consider problems of legitimation, power, rationalization, instrumental and communicative action, ideology, and systematically distorted communications as they appear more broadly in the practice of planners, policy analysts, or professionals.

**746 Informal Seminar in Planning Theory: Philosophy, Ethics, and Values in Planning**

Fall or spring. Credit as assigned. J. Forester.  
An informal seminar to discuss problems of values, ethics, and alternative philosophical positions that are inherent in various planning proposals or perspectives. The claims of incrementalists to the contrary, can planning be ethical? Must value judgments be arbitrary?

**748 Fieldwork or Workshop in Social Policy Planning**

Fall or spring. Credit as assigned. Staff.  
Work on applied problems in social-policy planning in a field or laboratory setting or both.

**749 Special Topics in Social-Policy Planning**

Fall or spring. Credit as assigned. Staff.  
Staff.

**Urban Development Planning****[551 Suburbanization and Metropolitan America**

Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1983–84. I. R. Stewart.  
The major issues in suburban development, metropolitan growth analysis, and the role of new communities in accommodating expected future population.]

**552 Urban Land-Use Planning I**

Spring. 3 credits. K. C. Parsons.  
Surveys, analyses, and plan-making techniques for guiding physical development of urban areas; location requirements, space needs, interrelationships of land uses. Emphasis on residential, commercial, and industrial activities and community facilities; housing and neighborhood conditions. Lectures, seminars, and field exercises.

**553 Urban Land-Use Planning II**

Fall. 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 Developments, public and institutional facilities, open space, land banking, central business districts, neighborhoods, energy-impacts, transportation-impacts, and others.

**554 Introduction to Planning Design**

Fall. 3 credits. T R 12:20–1:10. S. Stein.  
Intended for students without design backgrounds. Lectures, seminars, readings, and design exercises explore basic concepts and issues related to urban planning, urban design, site planning, and environmental awareness. Emphasis is on professional practice.

**[555 Planning and Design Workshop** Fall 2 or 4 credits. No previous graphics or design experience required. Not offered 1983–84. S. Stein.

A studio course focusing on planning and design problems related to the built environment. An understanding of the design process is developed, and graphic communication techniques are explored.]

**556 Built-Environment Education Workshop** Fall or spring. 2 or 4 credits.

Fieldwork hours to be arranged. Organizational meeting 10:10 first F of classes. S. Stein. Interdisciplinary teams of students from planning, architecture, landscape architecture, historic preservation, and other environmental design disciplines work in elementary, middle school, and high school classrooms with school children and teachers to deepen their understanding of the impact of the built environment on their lives and to encourage their participation in the shaping of their own environment. Work in local schools is emphasized.

**557 Small-Town Community Design Workshop**

Fall or spring. 4 credits.

S. Stein and staff.

An in-depth approach to the problems and challenges facing the small-town commercial district. Various aspects of planning, historic preservation, landscape architecture, and design, including building and storefront rehabilitation, graphics and signage, construction details, and presentation are explored in workshop and studio settings.

**[558 Urban Transportation and Land-Use Planning** 4 credits. Open to upper-level undergraduates. Not offered 1983–84.

S. Czamanski, K. C. Parsons.

Theoretical, analytical aspects of the relationships between land-use planning and transportation system planning; land-use transportation models; analysis of travel-demand generation by land use; forecasting related to population and urban growth; methods of transportation-demand analysis, modal split, project evaluation; national, regional, and local transportation policy related to regional and urban development; system and segment design and aesthetics; freeway, mass transit, and local street design; relationships between local area planning and transportation improvements, including environmental aspects of noise, air pollution, erosion control.]

**[651 Urban Land Policy and Programs** Fall. 3 credits. Prerequisite: CRP 653 or permission of instructor. Not offered 1983–84.

M 1:25–3:15. J. W. Reys.

Major problems of urban land control and management, and possible solutions are considered. Subjects for discussion include taxation, compensation and betterment, large-scale public land acquisition, subsidies and incentives, and acquisition of developmental rights.]

**652 The Urban Development Process** Spring 2 credits. Enrollment limited. Prerequisite: CRP 511 or permission of instructor.

M 3:35–5:30. J. W. Reys.

Examination of the goals, strategies, methods, and achievements of major participants in the urban land and building market: land owners, speculators, real estate brokers, developers, bankers, lawyers, nonprofit builders, and government agencies.

**653 Legal Aspects of Land-Use Planning** Spring 3 credits. Prerequisite: CRP 511 or permission of instructor.

R 12:20–2:15. Staff.

Survey of leading cases and legal concepts in land-use planning, with particular attention to zoning, subdivision control, condemnation, and growth-control issues.

**656 Land Resources Protection Law** Fall 3 credits.

M W F 9:05–9:55. R. Booth.

Examines legal issues raised by government efforts to protect critical land resources such as tidal wetlands, flood plains, forests and agricultural lands, and large resource areas such as the coastal zone. Students will utilize a broad selection of legal materials and learn to use the basic resources of a law library.

**750 Urban Land Policy and Programs—Special Problems** Fall or spring. Credit as assigned. Staff.

**758 Fieldwork or Workshop in Urban Development Planning** Fall or spring. Credit as assigned. Staff.

Work on applied problems in urban development planning in a field or laboratory setting or both.

**759 Special Topics in Urban Development Planning** Fall or spring. Credit as assigned. Staff.

**859 Informal Study in Urban Development Planning** Fall or spring. Credit as assigned. Staff.

## Special Interprogram Topics: History and Preservation

**461 Methods of Archival Research (also Architecture 542)** 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.

**462 The American Planning Tradition** Fall 4 credits. No prerequisites.

M W F 9:05. J. W. Reys.

A systematic review of American city planning history, beginning with the earliest colonial settlements and ending with the era of the New Deal. An introductory lecture course requiring no previous exposure to planning or architecture, and a prerequisite for students intending to take advanced seminars or independent studies in planning history.

**560 Documentation for Preservation (also Architecture 546)** Fall. 3 credits.

M 2:30–5:30. M. A. Tomlin.

Methods of identifying, recording, collecting, processing, and analyzing information dealing with historic and architecturally significant structures, sites, and objects.

**561 Historic Preservation Planning Workshop: Surveys and Analyses (also Architecture 547)** Fall or spring. 4 credits.

R 3:30–6:30. T. Werbizky.

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.

**562 Perspectives on Preservation (also Architecture 545)** Fall. 3 credits.

T 1:25–4:25. M. A. Tomlin and visiting lecturers. 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.

**563 Problems in Contemporary Preservation Practice (also Architecture 544)** Spring. Variable credit.

M. A. Tomlin, T. Werbizky.

A review and critique of ongoing preservation projects, and an investigation of areas of expertise currently being developed, presented by staff and guest lecturers.

**564 Building Materials Conservation (also Architecture 645)** Spring. 3 credits. Open to juniors, seniors, and graduate students.

M. A. Tomlin.

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.

**565 American Planning in the Early Twentieth Century** Fall. 3 credits. Prerequisite: introductory course in American architectural or planning history.

W 2:30–4:25. J. W. Reys.

Urban and regional plans, planners, and planning during the period between the Senate Park Commission proposals for Washington in 1902 and the beginning of World War II. Students will use the unique collection of papers of twentieth-century planners in Olin Library and the extensive holdings of early printed reports in the Fine Arts Library. Lectures, seminar discussions, and presentation of student research papers.

**566 Urban Planning in Colonial and Nineteenth-Century Hispanic America** Spring 3 credits. Prerequisite: permission of instructor.

J. W. Reys.

The planned origins and growth of towns and cities in Latin America and in those portions of the United States colonized by Spain. Lectures, readings, bibliographic studies, translations, cartographical exercises, and seminar presentations. Each student will produce a research paper on an aspect of the subject, using library resources at Cornell and elsewhere.

**660 Seminar in the History of American City Planning** Spring. 3 credits. Prerequisites: CRP 462 or permission of the instructor.

J. W. Reys.

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.

**661 Historic Preservation Planning Workshop: Plans and Programs** Fall and spring. Variable credit. Prerequisite: CRP 561.

Hours to be arranged. T. Werbizky.

Preparation of elements of historic preservation plans, designs, legislation, and special studies. Individual or group projects are selected by students. Fieldwork is emphasized.

**[662 Seminar in American Urban History** Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1983–84.

M 10:10–12:05. I. R. Stewart.

Seminar in the historical evolution of the American city. Emphasis on factors in urban growth, the process of urbanization, urban reform movement, and intellectual and social responses to the city.]

**663 Historic Preservation Law** Spring 3 credits. Offered alternate years.

M W 11:15–12:05. R. Booth.

Law of historic district and landmark designation; tools for preservation (such as police power, taxation, eminent domain); recent developments in state and federal historic preservation mandates.



**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.

**[665 Public Policy and Preservation Planning]** Spring 3 credits. Not offered 1983–84.  
I. R. Stewart.

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.]

**768 Fieldwork or Workshop in History and Preservation** Fall or spring. Credit as assigned.  
Staff.

Work on applied problems in history and preservation planning in a field or laboratory setting or both.

**769 Special Topics in History and Preservation** Fall or spring. Credit as assigned.  
Staff.**869 Informal Study in History and Preservation** Fall or spring. Credit as assigned.  
Staff.**Special Interprogram Topics:  
International Studies****470 Third World Urbanization** Spring 4 credits.  
W. W. Goldsmith and staff.

Study of rapid growth and contemporary crisis in the giant cities of the underdeveloped countries. Examination of the enormous problems of planning for employment, housing, and social services. Analysis of the relations of profits to poverty, industrialization to the "informal sector," and the global economy to domestic politics. Case studies from Brazil, China, Cuba, Nigeria, the Philippines, and Venezuela.

**[570 Seminar in Latin American Urban Planning and Development]** Fall or spring. 2 credits. Not offered 1983–84.

S. Stein and guest lecturers. Seminars covering the broad urban planning and development problems facing Latin American cities. Historical development; current and future physical, social, economic, and administrative issues focusing on urban areas, with consideration of their regional context. Coordinated with City and Regional Planning 571.]

**[571 Workshop in Latin American Urban Planning and Development]** Fall or spring. 4 credits. Not offered 1983–84.

S. Stein. Application of planning theories and methodologies to problems of Latin American cities. Selection of specific urban planning projects for survey, analysis, policy formulation, plan preparation, and program development. Students work in teams or individually in workshop-studio setting.]

**[670 Regional Planning and Development in Developing Nations]** Fall 4 credits. Prerequisite: second-year graduate standing. Not offered 1983–84.

T 2:30–5. W. W. Goldsmith. Extensive case studies of development planning are analyzed. Focus is on a Marxist critique of the process of regional development through urbanization, and in particular in 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.]

**671 Seminar in International Planning** Spring 1 credit. S-U grades only.  
F 12:20–1:30. Staff.

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.

**[771 Seminar in Science and Technology Policy in Developing Nations]** Spring 3 credits. Not offered 1983–84.  
D. Lewis.

An examination of the issues facing developing countries as they endeavor to use technology in pursuit of their national goals. Topics include alternative choices of technology and the associated impacts, the role of multinational corporations, government policy-making institutions, manpower development and utilization strategies, and policy instruments.]

**[772 Seminar in Policy Planning in Developing Nations: Technology Transfer and Adaption]** Fall 3 credits. Not offered 1983–84.  
F 10:10–12:05. D. Lewis.

An exploration of the international transfer of technology to developing nations and the policies used to guide this process. Topics covered include the role of foreign aid and multinational corporations, economic rationale for choice of appropriate technology, and social benefit-cost analysis. Case studies are emphasized.]

**[773 Seminar in Project Planning in Developing Countries]** Spring 3 credits. Not offered 1983–84.  
M 1:25–3:20. D. Lewis.

An examination of the problems and issues involved in the process of planning and implementing development projects in developing countries. The role of the planner is explored from several different disciplinary points of view through a series of case studies selected from agriculture, industry, rural development, and urban planning. Countries typically represented include Egypt, Ethiopia, India, Jordan, Korea, Mexico, Nepal, and the Commonwealth of Puerto Rico.]

**774 Science, Technology, and Development** Fall 3 credits.  
P. Olpadwala.

The place and role of science and technology as a factor in socioeconomic growth is examined, with special reference to developing regions. The social underpinnings and linkages of science and technology are studied and their role explored as a nonneutral and dynamic social force that primarily serves the ends of particular groups in societies. Current issues such as technological development, technology transfer, and appropriateness of technology are discussed in this context, with attention given to both rural and industrial development. Third World science and technology policy-planning options are considered throughout the course.

**775 Transnational Corporations and Developing Regions** Spring 3 credits.  
P. Olpadwala.

Transnational corporations are studied in the context of socioeconomic development. Contending theories of the international firm are examined as a starting point for evaluating contradictory claims and counterclaims of proponents and detractors of transnational corporations. Advantages and disadvantages for developing regions are considered and Third World planning and policy options discussed on an ongoing basis.

**777 Theories of Development and Underdevelopment** Spring 3 credits.  
P. Olpadwala.

Various theories attempting to analyze and explain the phenomena of underdevelopment are examined. Although a range of thought and approaches are

considered, the accent is on aspects of political economy revolving around concepts of class and exploitation. Topics include the transition to capitalism; dependent and uneven development; various issues of growth and fluctuation under contemporary capitalism, including crises; rural and industrial development in less-developed countries; and planning for development.

**778 Fieldwork or Workshop in Planning for Developing Regions** Fall or spring. Credit as assigned.  
Staff.

Work on applied problems in planning for developing regions in a field or laboratory setting or both.

**779 Special Topics in Planning for Developing Regions** Fall or spring. Credit as assigned.  
Staff.**878 Advanced Fieldwork or Workshop in Planning for Developing Regions** Fall or spring. Credit as assigned.  
Staff.

Work on applied problems in planning for developing regions in a field or laboratory setting or both.

**879 Informal Study in Planning for Developing Regions** Fall or spring. Credit as assigned.  
Staff.**Special Interprogram Topics:  
Environmental Health, Housing, and Institutional Planning****480 Environmental Politics** Spring 3 credits.  
M W F 11:15. R. 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.

**481 Urban Aesthetics** Spring 3 credits.  
T R 10:10–11:40. K. C. Parsons.

Investigation of historical and current thought about the visual aspects of cities, including evaluation of technological and cultural influences on urban design, and the influence of perception on urban form; relationships between urban planning and visual form in cities.

**490 Tutorial in Urban and Regional Studies** Fall or spring. Variable credit. S-U grades only. Limited to undergraduate students in the Urban and Regional Studies program.  
Staff.

Research, reading, and/or writing project that a student and faculty member choose on a topic related to urban and regional studies.

**585 Introduction to Environmental Health Issues** Spring 3 credits.  
F 2:30–4:25. B. G. Jones.

An examination of concepts and issues in environmental health, particularly as they relate to planning for health and medical care delivery systems, economic development, and other policy issues.

**685 Environmental Epidemiology** Spring 3 credits. Prerequisite: CRP 520.  
W 9:05–11. P. Brandford.

Introduction to epidemiological methods. Emphasis is on the detection of changes in health status associated with changes in environmental conditions, and the significance of these findings for environmental health planning.

**[686 Environmental Law, Policy, and Management]** Fall 3 credits. Not offered 1983–84.  
M W F 11:15–12:05. R. Booth.

Examination of selected environmental law topics from a policy management standpoint. Topics include

environmental impact statement preparation and analysis, pollution control laws, and government regulatory procedures.]

### 687 Environmental Management Workshop

Spring. 3 credits.

M W F 9:05. R. Booth.

Research and analysis of environmental management topics of current interest at the state or local government level. Fieldwork is emphasized; students produce reports, recommendations, or draft legislation that contributes to solving current issues.

### 688 Environmental Law II: Natural Resources and Toxic Substances (also Civil and Environmental Engineering 626)

Spring. 3 credits.

Prerequisite: one course in environmental law or permission of the instructors.

Sem. hours to be arranged. R. Booth, N. Orloff. Environmental Law I (CEE 625) introduces students to the way the legal system operates and explores the legal doctrines governing the environmental impact statement process and air pollution. This course extends that introduction on two different levels. It exposes students to the legal doctrines in the fields of natural resources and toxic substances. Topics such as resource conservation and public lands management, as well as regulation of carcinogens and disposal of hazardous wastes, are considered. It is intended to sharpen the student's nascent legal skills. Close attention is given to the analysis of legislation and judicial decisions. In addition, students prepare a major paper designed to give them experience using a law library and doing independent legal research. The course's goal is to improve the student's ability to understand the legal dimensions of national environmental policy.

### [784 The Political Economy of Health Planning

Spring. 3 credits. Not offered 1983–84.

R 11:15–1:45. Staff.

Lectures, reading, and fieldwork, and theoretical and practical materials are combined to develop operating skills in health planning. The critical focus is on (1) the social determinants of illness, (2) the engineering model of medicine, (3) the commodity form of medical care, and (4) the prevailing economic definition of health. These topics together comprise the social context in which health planning takes place. After an intensive institutional introduction to health planning legislation, organizations, and practices, participants in the course work in one of four health planning research projects conducted in the surrounding area. Contact with local and regional organizations in and out of health planning is included.]

### 785 Planning and Evaluation of Environmental Health Programs and Projects

Spring. 3 credits

Prerequisite: second-year graduate standing.

T R 9:05. P. Brandford.

An examination of the use of quantitative methods and economic analysis as aids to social decision making for action in the area of environmental health. Applications of these methods to the study of particular problems of environmental health.

### 786 Environmental Health Planning

Fall. 2 credits. Prerequisite: second-year graduate standing.

M W 10:10. P. Brandford.

Introduction to concepts and issues in environmental health planning. Topics covered include the planning problems involved in the control of water quality, liquid and solid waste disposal, air quality.

### [787 Health Systems Planning

Fall. 3 credits. Not offered 1983–84.

T R 9:05–9:55. Staff and guest lecturers.

Issues, institutions, politics, economics, and social elements involved in the planning and administration of health problems. Special emphasis is on planning techniques and methodologies.]

### 788 Fieldwork or Workshop in City and Regional Planning

Fall or spring. Credit as assigned.

Staff.

Work on applied planning problems in a field or laboratory setting or both.

### 789 Special Topics in City and Regional Planning

Fall or spring. Credit as assigned.

Staff.

### 790 Professional Planning Colloquium I

Fall. 1 credit.

W 4:30–5:30. Staff.

### 791 Professional Planning Colloquium II

Spring. 1 credit.

W 4:30–5:30. Staff.

### 792 Master's Thesis, Project, or Research Paper I

Fall. Credit as assigned.

Staff.

### 793 Master's Thesis, Project, or Research Paper II

Spring. Credit as assigned.

Staff.

### 794 Planning Internships

Fall, spring, or summer. 1–4 credits.

Staff.

Combines a professional planning internship in a metropolitan area with academic study in order 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.

### 795 Master's Thesis in Preservation Planning

Fall. Credit as assigned.

Staff.

### 796 Master's Thesis in Preservation Planning

Spring. Credit as assigned.

Staff.

### 888 Informal Studies in Environmental Health Planning

Fall or spring. Credit as assigned.

Staff.

### 889 Informal Study in City and Regional Planning

Fall or spring. Credit as assigned.

Staff.

### 890 Planning Research Seminar I

Fall. 2 credits.

Intended for doctoral candidates in city and regional planning; other students welcome.

Staff.

Presentation and discussion of current problem areas and research by advanced doctoral students, faculty, and visitors.

### 891 Planning Research Seminar II

Spring. 2 credits.

Staff.

### 892 Doctoral Dissertation I

Fall. Credit as assigned.

Staff.

### 893 Doctoral Dissertation II

Spring. Credit as assigned.

Staff.

## 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, E. J. Carter, T. H. Johnson, 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

#### \*201 Studio: Design Fundamentals

Fall. 6 credits.

T. H. Johnson, L. Mirin.

#### \*202 Studio: Site Planning

Spring. 6 credits.

M. I. Adleman, R. T. Trancik, P. J. Trowbridge.

#### \*205 Graphic Communication I

Fall. 3 credits.

P. J. Trowbridge.

#### \*206 Graphic Communication II

Spring. 3 credits.

R. T. Trancik.

#### \*220 Principles of Spatial Design

Fall. 3 credits.

R. T. Trancik.

#### \*224 Plants and Design

Fall. 3 credits.

M. I. Adleman.

#### \*301–302 Studio: Regional Landscape Planning

Fall. LA 301, weeks 1–7, 3 credits; LA 302, weeks 8–14, 3 credits. One or both courses may be taken.

P. J. Trowbridge.

#### \*303–304 Studio: Urban Design

Fall. LA 303, weeks 1–7, 3 credits; LA 304, weeks 8–14, 3 credits. One or both courses may be taken.

R. T. Trancik.

#### \*306 Studio: Interdisciplinary Site Planning Process

Spring. 6 credits.

T. H. Johnson.

#### \*310 Site Construction I

Spring. 4 credits.

P. J. Trowbridge.

#### \*311 Site Construction II

Fall. 4 credits.

T. H. Johnson, M. I. Adleman.

#### \*340 Landscape Design

Fall. 4 credits.

M. I. Adleman, T. H. Johnson.

#### \*401 Studio: Professional Practice

Fall, weeks 1–7. 3 credits.

M. I. Adleman.

#### \*403 Studio: Advanced Site Design

Fall, weeks 8–14. 3 credits.

M. I. Adleman.

#### \*405 Senior Project Seminar

Fall. 1 credit.

P. J. Trowbridge.

\*Offered through the College of Agriculture and Life Sciences.

**\*406 Studio: Senior Project** Spring, 6 credits  
R. T. Trancik, P. J. Trowbridge

**\*421 Professional Practice Seminar** Fall,  
2 credits  
E. J. Carter.

**\*432 Introduction to Parks and Recreation**  
Spring, 2 credits.  
E. J. Carter.

**\*435 Urban Environmental Planning** Fall,  
2 credits.  
E. J. Carter.

**\*436 Urban Environment Workshop** Spring  
2 credits.  
E. J. Carter.

**490 Special Topics In Landscape Architecture**  
Fall or spring, 1–5 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.

**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.

**500 Graduate Orientation Seminar** Fall 1 credit  
S-U grades only.  
L. Mirin.

Presentation and discussion of work of Cornell faculty  
in and related to the Field of Landscape Architecture.

**501 Studio: Design Fundamentals** Fall, 6 credits  
T. H. Johnson, L. Mirin.  
An introduction to basic landscape architectural  
design principles, design process, problem-solving  
approaches, and design skills.

**\*502 Studio: Site Planning** Spring, 6 credits  
M. I. Adelman, R. T. Trancik, P. J. Trowbridge.

**520 Contemporary Issues in Landscape  
Architecture** Fall, 2 credits.  
Lec, F 11:15–1:10. L. Mirin.  
Presentations on topics of currency and significance  
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.

**521 History of Landscape Architecture I** Fall  
3 credits.  
Lecs, T R 11:15–12:05; 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.

**522 History of Landscape Architecture II** Spring  
3 credits.  
Lec, T R 11:15–12:05; 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.

**530 Urban Landscape Planning and Design**  
Spring, 3 credits.

Lec, disc, and field trips to be arranged. L. Mirin.  
The principles and techniques of landscape  
architectural development and conservation of urban  
open spaces. Areas studied include the urban  
landscape tradition, urban arboriculture, streets and  
strollways, design controls and public space,  
recreation, and housing.

**\*531 Regional Landscape Planning I** Fall,  
3 credits.  
A. S. Lieberman

**\*532 Regional Landscape Planning II** Spring  
3 credits.  
A. S. Lieberman.

**\*601–602 Studio: Regional Landscape Planning**  
Fall, LA 601, weeks 1–7, 3 credits; LA 602, weeks  
8–14, 3 credits.  
P. J. Trowbridge.

**\*603–604 Studio: Urban Design** Fall, LA 603,  
weeks 1–7, 3 credits; LA 604, weeks 8–14, 3 credits.  
R. T. Trancik.

**\*606 Studio: Interdisciplinary Site Planning**  
Spring, 6 credits.  
T. H. Johnson.

**\*607 Studio: Professional Practice** Fall, weeks  
1–7, 3 credits. Required 5-day field trip.  
M. I. Adelman.

**\*609 Studio: Advanced Site Design** Fall, weeks  
8–14, 3 credits.  
M. I. Adelman.

**621 Summer Internship Seminar** Fall, 2 credits.  
Hours to be arranged. L. Mirin.  
Presentation and discussion of projects developed  
during summer internships.

**\*634 Landscape Architectural Research** Spring,  
3 credits.  
T. H. Johnson.

**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.

**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.

## Faculty Roster

Bertoia, Roberto, M.F.A., Southern Illinois U. Asst.  
Prof., Art  
Blum, Zevi, B.Arch., Cornell U. Assoc. Prof., Art  
Booth, Richard S., J.D., George Washington U. Asst.  
Prof., City and Regional Planning  
Bowman, Stanley J., M.F.A., U. of New Mexico.  
Assoc. Prof., Art  
Brandford, Paul, Ph.D., Harvard U. Asst. Prof., City  
and Regional Planning  
Clavel, Pierre, Ph.D., Cornell U. Prof., City and  
Regional Planning  
Cohen, Peter, M.Arch., Harvard U. Adjunct Assoc.  
Prof., Architecture  
Colby, Victor E., M.F.A., Cornell U. Prof. emeritus, Art  
Crump, Ralph W., B.Arch., Cornell U. Prof.  
emeritus, Architecture  
Czarnanski, Stan, Ph.D., U. of Pennsylvania. Prof.,  
City and Regional Planning

Daly, Norman, M.A., Ohio State U. Prof. emeritus, Art  
Dennis, Michael D., B.Arch., U. of Oregon. Prof.,  
Architecture  
Evelt, Kenneth W., M.A., Colorado Coll. Prof. emeritus,  
Art  
Forester, John, Ph.D., U. of California at Berkeley.  
Asst. Prof., City and Regional Planning  
Goehner, Werner H., M.Arch., Cornell U. Asst. Prof.,  
Architecture  
Goldsmith, William W., Ph.D., Cornell U. Prof., City  
and Regional Planning  
Greenberg, Donald P., Ph.D., Cornell U. Prof.,  
Architecture  
Hascup, George E., B.Arch., U. of California at  
Berkeley. Assoc. Prof., Architecture  
Hodgden, Lee F., M.Arch., Massachusetts Inst. of  
Technology. Adjunct Assoc. Prof.  
Jones, Barclay G., Ph.D., U. of North Carolina. Prof.,  
City and Regional Planning  
Kelly, Burnham, M.C.P., Massachusetts Inst. of  
Technology. Prof. emeritus, City and Regional  
Planning  
Kira, Alexander, M.R.P., Cornell U. Prof., Architecture  
Kubelik, Martin, Ph.D., Rheinisch-Westfälische  
Technische Hochschule (Germany). Assoc. Prof.,  
Architecture  
Lewis, David B., Ph.D., Cornell U. Assoc. Prof., City  
and Regional Planning  
Locey, Jean N., M.F.A., Ohio U. Asst. Prof., Art  
MacDougall, Bonnie G., Ph.D., Cornell U. Asst. Prof.,  
Architecture  
MacDougall, Robert D., Ph.D., Cornell U. Asst. Prof.,  
Architecture  
Mackenzie, Archie B., M.Arch., U. of California at  
Berkeley. Assoc. Prof., Architecture  
Meyer, Elizabeth H., M.F.A., U. of Texas. Asst.  
Prof., Art  
Mikus, Eleanor, 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. Asst. Prof.,  
Architecture  
Nelkin, Dorothy W., B.A., Cornell U. Prof., City and  
Regional Planning/Program on Science,  
Technology, and Society/Sociology  
Olpadwala, Porus, Ph.D., Cornell U. Asst. Prof., City  
and Regional Planning  
Otto, Christian F., Ph.D., Columbia U. Prof.,  
Architecture  
Page, Gregory, M.F.A., U. of Wisconsin. Asst. 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  
Pittman, Jon H., M.S., Cornell U. Asst. Prof.,  
Architecture  
Poleskie, Stephen F., B.S., Wilkes Coll. Prof., Art  
Reps, John W., M.R.P., Cornell U. Prof., City and  
Regional Planning  
Richardson, Henry W., M.R.P., Cornell U. Assoc. Prof.,  
Architecture  
Romanach, Maria, M.Arch., Princeton U. Assoc. Prof.,  
Architecture  
Rowe, Colin F., M.A., U. of London (England). Prof.,  
Architecture  
Saltzman, Sid, Ph.D., Cornell U. Prof., City and  
Regional Planning  
Saul, Francis W., M.S., Harvard U. Assoc. Prof.,  
Architecture  
Schack, Mario L., M.Arch., Harvard U. Prof.,  
Architecture  
Schiler, Marc, M.S., Cornell U. Asst. Prof.,  
Architecture  
Seley, Jason, B.A., Cornell U. Prof., Art  
Senkevitch, Anatole, Ph.D., Cornell U. Assoc. Prof.,  
Architecture  
Shaw, John P., M.Arch., Massachusetts Inst. of  
Technology. Prof., Architecture  
Singer, Arnold, Prof., 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  
Stewart, Ian R., Ph.D., Cornell U. Assoc. Prof., City  
and Regional Planning  
Ungers, O. Mathias, Diploma, Technical U. Karlsruhe  
(Germany). Prof., Architecture  
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

## College of Arts and Sciences

### Administration

Alain Seznec, dean  
 Lynne S. Abel, associate dean  
 Geoffrey V. Chester, associate dean  
 Urbain J. DeWinter, associate dean and director of admissions  
 Jack W. Lowe, director of finance and administration  
 Lloyd Carter-Leavitt, director of development

### College of Arts and Sciences 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
Deadline for submitting independent major requests (first meeting). Go to Academic Advising Center, Goldwin Smith Hall, for further information.	Sept. 10	Feb. 2
Last day for adding courses without petition	Sept. 21	Feb. 10
Last day for dropping courses without \$10 fee.	Sept. 21	Feb. 10
Last day for changing grade option (S-U).	Sept. 21	Feb. 10
Deadline for submitting independent major requests (second meeting).	Oct. 14	March 12
Last day for requesting leave of absence or withdrawal for the current term.	Oct. 26	March 16
Last day for dropping courses without petition.	Oct. 26	March 16
Deadline for requesting permission to study in absentia.	End of the preceding semester	
Advance course enrollment for the following term (tentative).	Oct. 31–Nov. 11	April 9–20
Deadline for applying to the College Scholar Program.	Last day of finals, May	
Deadline for requesting internal transfer to the College of Arts and Sciences for the following term.	Dec. 1	June 1

### Program of Study

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, 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 professional colleges to supplement their studies. Finally, the college is a graduate school and research center attracting faculty whose active involvement in writing and

research requires first-rate academic facilities and whose energetic participation in undergraduate teaching brings to their students the most current ideas in modern scholarship. It is this combination of functions that gives the college its distinctive character.

The variety and 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. Yet the faculty believe that there should be a recognizable pattern to each student's education.

That pattern includes familiarity with the several different modes of thought that are reflected in the natural sciences, 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) Minimum number of courses:** 34 courses.
- 2) Freshman Seminar:** Two courses.
- 3) Foreign language:** Qualification in two languages or proficiency in one (zero to four courses for proficiency in one language; zero to six courses for qualification in two, depending on placement).
- 4) Distribution:** An approved sequence of 2 full courses (6–8 credits) in each of the four groups listed below:
 

Group 1	a. Biological sciences b. Physical sciences
Group 2	a. Social sciences b. History
Group 3	a. Humanities b. Expressive arts
Group 4	a. Mathematics and computer science b. A course sequence in one of the subdivisions above that has not been used to satisfy group 1, 2, or 3. See p. 95.
- 5) Major**
- 6) Electives:** four or five courses (or 15 credits) in courses not used to fulfill other requirements and not in the major department.
- 7) Credits:** A total of 120 credits, of which 100 must be taken in the College of Arts and Sciences.
- 8) Residence:** Eight full-time terms, unless a student can successfully complete the other requirements in fewer than eight terms and is allowed to accelerate graduation. See p. 98.
- 9) Physical education:** Completion of the University requirement. See p. 23.

Ordinarily a student may not use the same course to fulfill more than one college requirement. See page 96.

### Minimum Number of Courses and Credits

Students who are first admitted to the College of Arts and Sciences in the fall of 1980 or thereafter must complete at least thirty-four courses to graduate, that is, four to five courses a semester. Most courses are assigned 3 or 4 credits. Some are assigned 2 credits and count as one-half courses toward the thirty-four. When single-credit courses form a part of a series (certain offerings in mathematics, biology, and music, for instance) they can be aggregated to count as one-half 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 in absentia, and courses taken in

special off-campus residential programs may be counted towards the 100 credits required within the college and also toward the required thirty-four courses.

### Freshman Seminars

Each semester of their freshman year in the college, students choose a Freshman Seminar from among more than seventy courses offered by over twenty different departments in the humanities, social sciences, and expressive arts. These courses all share one major purpose: to offer the student practice in writing English prose. They also ensure that all beginning students may have the benefits afforded by a small class.

### Language Requirement

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 Literature, Modern Languages and Linguistics, Near Eastern Studies, Romance Studies, and Russian Literature.

There are two ways of satisfying the language requirement:

- 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 or Japanese 160; Near Eastern Studies 102 or 122 in Hebrew or 112 in Arabic; Classics 103 or 104 in Greek; Classics 106, 107 or 108 in Latin.
- 3) A score of 560 or better on the College Placement Test (CPT).
- 4) Placement in a 200-level course by special examination (in cases where no CPT is available).

A student may submit a 560 CPT 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 in order to be better prepared for the 200-level courses.

**Speakers of languages other than English** may get 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 for 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.

#### 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 upon the language course and the level of achievement:

- 1) French, German, Italian, Latin 105, Russian, and Spanish courses: 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. In order to do this, students register with the Academic and Career Counseling services, 203 Barnes Hall, and pay a fee of \$5.
- 2) Latin (all courses except 105): departmental examination.
- 3) Hebrew: departmental examination.
- 4) Other languages: special examinations; see professor in charge.
- 5) 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).

A 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 hours of advanced standing credit. Students who do not have high achievement scores are eligible for the courses listed in the charts below, depending on their scores. For other languages or for special problems, students should see the professor in charge.

<b>French</b>		
CPT Reading Score	Language Courses	Literature Courses
Below 450	121	
450–559	123	
560–649	203	200 211 201

650 and above Apply for the Cornell Advanced Standing Examination (CASE)

<b>German</b>		
CPT Reading Score	Language Courses	Literature Courses
Below 450	121	
450–559	123	
560–649	203	201
650 and above	Apply for the Cornell Advanced Standing Examination (CASE)	

<b>Italian</b>		
CPT Reading Score	Language Courses	Literature Courses
Below 450	121	
450–559	123	
560–649	203	201
650 and above	Apply for the Cornell Advanced Standing Examination (CASE)	

<b>Russian</b>		
CPT Reading Score	Language Courses	Literature Courses
Below 450	101 121	
450–559	102 123	
560–649	203	201
650 and above	Apply for the Cornell Advanced Standing Examination (CASE)	

<b>Spanish</b>		
CPT Reading Score	Language Courses	Literature Courses
Below 450	121	
450–559	123	
560–649	203 211	201
650 and above	Apply for the Cornell Advanced Standing Examination (CASE)	

## Latin

### CPT

Reading Score	Course Number
Below 450	105
450–649	Placement by examination
650 and above	Apply for the Cornell Advanced Standing Examination (CASE)

## Hebrew

Placement by departmental examination

## Advanced Standing Credit

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

Credit may be granted for high school work for the equivalent of language courses numbered 203, 204. The amount of credit is based on performance on one or more of the following examinations:

- a) CPT 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:* Students should consult the Department of Classics, 120A Goldwin Smith Hall. Students may be tentatively placed in a 300-level Latin course if they achieve a score of 4 or 5 on the CPT Advanced Placement Examination, but they must also take the department's own placement examination during orientation week. A student who is permitted to register in a 300-level course will be given 6 advanced standing credits.  
*Greek:* For information concerning advanced placement, students should consult the chairman of the Department of Classics, 120A 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 CPT. For details on registration, see Language Course Placement and Credit, above. The maximum amount of credit is 6 hours.
- c) Special examinations are given for languages where no CPT exists.

## Distribution Requirement

The purpose of the distribution requirement is 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. To this end, 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 2 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. 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; however, students may petition to take Architecture 141–142, 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. Here is a complete list of the courses that fulfill distribution requirements.

## Group 1: Physical or Biological Sciences

### a. Physical Sciences

*Astronomy:* 101 or 111 plus 102 or 112; or Astronomy 102, or 112 plus Astronomy 332.  
*Astronomy* 103–104, identical to Astronomy 101–102 except for the omission of the laboratories, cannot be used to satisfy the distribution requirement.  
*Chemistry:* 103, 207, or 215 followed by 104, 208, or 216.  
*Geological sciences:* 101–102.  
*Physics:* Any two sequential courses such as 101–102 or 207–208; or any two general-education courses from the group 200–206, 209.

### b. Biological Sciences

A two-semester introductory biology sequence selected from Biological Sciences 109–110, or 105–106, or 101–103 plus 102–104. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) also satisfies the distribution requirement in the biological sciences. Biological Sciences 100, offered during the six-week Cornell Summer Session for 7 credits, also satisfies the distribution requirement.

## Group 2: Social Sciences or History

### a. Social Sciences

*Africana Studies:* Any two of 171, 172, 190, 231, 290, 301, 302, 344, 345, 346, 351, 352, 410, 420, 484, 485, 495, 550.  
*Anthropology:* Any two courses in the Department of Anthropology, or Archaeology 100 and any anthropology course listed under archaeology. Courses cross-referenced but not taught by members of the department do not satisfy the distribution requirement.  
*Archaeology:* Archaeology 100 and any one of the following: Archaeology 203, 281, 309, 317, 401, or Anthropology 116, 250, 352, 354, 355, 356, 358, 435, 456, 493, 494, 663, 664, 667.  
*Economics:* 101–102 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, and 181; or any one of these courses followed by a 300-level course in the same area.  
*Linguistics:* 101 or 111 and (1) any other course in linguistics or (2) any other course offered by the Department of Modern Languages and Linguistics for which one of these introductory linguistics courses is a prerequisite.  
*Near Eastern Studies:* Any two NES archaeology courses at the 200 or 300 level that form a reasonable sequence or combination.  
*Psychology:* Any two courses in psychology with the exception of Psychology 123, 322, 324, 326, 350, 361, 396, 422, 425, 471, 472, 473, 476, and 491.  
*Sociology:* 101–201 or one of these courses followed by any 200-level course in sociology.  
*Women's Studies:* Any two of 238, 244, 277, 321, 353, 422, 685, plus courses that have been taken previously, with the department's approval.

### b. History

*Africana Studies:* Any two of 203, 204, 231, 283, 344, 350, 360, 361, 370, 381, 405, 460, 475, 483, 490.  
*History:* Any two courses in the Department of History.

*Near Eastern Studies:* Any two NES history courses at the 200 or 300 level that form a reasonable sequence or combination.

*Women's Studies:* Any two of 227, 238, 326, 363, 426, 626, 627, plus courses that have been taken previously, with the department's approval.

### Group 3: Humanities or Expressive Arts

#### a. Humanities

*Africana Studies:* Any two of 219, 422, 431, 432, 492.

*Archaeology:* Archaeology 100 and any one of the following: Archaeology 275, 310, 362; Classics 206, 220, 221, 232, 233, 309, 320, 321, 329, 629, 630; Near Eastern Studies 243, 261, 263, 361, 362, 363, 364, 366, 367, 461, 469.

*Asian Studies:* Any two courses given by the department numbered 200 or above that form a reasonable sequence, but not including related courses in other departments unless the Department of Asian Studies grants permission.

*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 100, 102, 118, 119, 120, 121, 150, 200, 206, 211, 212, 220, 221, 222, 224, 225, 232, 233, 236, 237, 238, 245, 300, 309, 319, 320, 321, 322, 323, 326, 327, 329, 330, 331, 333, 336, 337, 339, 340, 350, 363, 366, 368, 423, 610, 629, 630.

*Comparative Literature:* Any two of the 200- or 300-level courses in comparative literature. 400-level courses may be used with the permission of the instructor.

*English:* Any two courses in English at the 200 level or above, except English 496. 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 of 201–202 or any 300-level literature courses.

*Near Eastern Studies:* Any two NES civilization or literature courses at the 200 or 300 level that form a reasonable sequence or combination.

*Philosophy:* Any two courses with the following exceptions: (1) Philosophy 100, if used to satisfy the Freshman Seminar requirement; (2) a combination of two courses in logic, such as 131, 231, 331, 431, 432, and 436.

*Russian Literature:* Any two courses at the 200 level or above.

*Spanish Literature:* Two of 201, 315, 316, 317, or any other 300-level literature courses.

*Women's Studies:* Any two of 248, 249, 251, 348, 399, 451, 453, 456, 467, 478, 479, 483, 493, plus courses that have been taken previously, with the department's approval.

#### b. Expressive Arts

*Africana Studies:* Any two of 137, 138, 285, 303, 465.

*Archaeology:* Archaeology 100 and any one of the following: History of Art 220, 221, 320, 321, 322, 323, 325, 327, 329, or 330.

*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 Seminars and Music 122. 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.

*Women's Studies:* Any two of 248, 249, 348, 399, 451, 453, 478, 479, 483, 493, plus past courses, with the department's approval.

### Group 4: Mathematics or an Unused Subdivision

#### a. Mathematics and Computer Science

Any 6 credits in Mathematics, but not including more than one course from 105, 107, 403. Computer Science 100 or 211 may be used for three of these credits. The mathematics distribution requirement is also satisfied by a score of 3 on the CEEB calculus BC examination. Mathematics 109 and ALS 115 (College of Agriculture and Life Sciences) *do not* satisfy 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.

### The Major

In their last two years, students devote roughly one-half their time acquiring depth and competence in a major subject. The choice of major is not intended to lead to a lifetime's occupation, although it may do so. By selecting one field of interest, students can do advanced work and focus the full extent of their imaginative and intellectual capacities on something they care about.

Students 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 as a major any student whose performance does not meet departmental standards. Some majors require courses in related subjects outside the department or outside the college; required courses taken outside the college are considered to be part of the 100 credits required in the College of Arts and Sciences for graduation. Majors are offered by each of the departments except the Department of Astronomy. There are also majors in Africana studies, American studies, archaeology, biology and society, dance, German area studies, Russian and Soviet studies, and social relations.

Some students wish 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.

### Electives

Of the thirty-four courses, or 120 credits, required for graduation, about half are free electives. Students must complete four or five courses or 15 credits in courses that are offered outside the major and are not used to fill another requirement. Electives taken in other divisions of the University may be used to gain practical training or specialized knowledge.

### Courses 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 department 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 who take English 211–212 may fulfill both the Freshman Seminar requirement and the humanities or expressive arts distribution requirement by taking two Freshman Seminars offered in English, history, history of art, Classics, philosophy, romance studies, Russian literature, German literature, or comparative literature.

Courses used to fulfill college requirements may be taken for S-U grades.

### Residence

The college expects its students to earn credits toward the degree during full-time study at Cornell, normally for eight semesters. Participation in approved programs such as in absentia study, fieldwork programs, or Cornell-in-Washington, which the college encourages, is considered study at Cornell. Students occasionally enter with advanced placement credit from other institutions (this does not include advanced placement credit from the CPT 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. If the courses are accepted as part of the major, the credits will count as part of the 100 needed in the college and thus leave more flexibility for taking courses in other colleges at Cornell, but still no more than 20 credits will be accepted from other institutions (excepting approved in absentia study, for which up to 30 credits will be accepted).

Credits earned at other institutions 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 accumulated at other institutions without special permission from the Committee on Academic Records. Students are not allowed to be part-time students during their eight regular semesters unless they meet the criteria described on page 99 or present convincing academic reasons for part-time study.

This policy will take effect immediately for students about to go to summer school or on leave or who are requesting now to complete their degrees elsewhere. The new requirements governing acceleration take effect with the class of 1985.

**Ninth term.** Students may spend a ninth term in residence by notifying the Records and Scheduling Office, 142 Goldwin Smith Hall. Students receiving financial aid should discuss funding with an adviser in the Office of Financial Aid.

### Physical Education

See University Requirements for Graduation, p. 23. The college does not count physical education credit toward the 120 credits required for graduation.

## 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 majors if they wish 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 usual requirements for the baccalaureate degree. Students should contact the director of the Independent Major Program, Academic Advising Center, 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.

**Honors.** Candidates for honors must have a cumulative average of 3.0, no grade below B in courses for the major, and a cumulative average of 3.5 for courses in the major. During their senior year candidates for honors complete a thesis or honors project. Interested students should confer with the director of the Independent Major Program before the start of the senior year.

### 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) and, unless they receive special permission from the program to accelerate, eight full terms in the College of Arts and Sciences. 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 requirement, but 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 in May of the freshman year. Students should contact the Academic Advising Center, Goldwin Smith Hall, for further information.

**Honors.** Candidates for honors must maintain a 3.5 average in all courses and must complete two College Scholar seminars. Nonscientists should complete one seminar in some aspect of science, and scientists at least one in the humanities or social sciences. During the senior year candidates for honors complete a thesis or honors project. Students interested in the honors program should confer with the director of the College Scholar Program before the start of the senior year.

### 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 will want, however, to become accepted as a major and be assigned an adviser in each department.

### Dual Degree Program

Especially able students may earn both a Bachelor of Arts degree from the College of Arts and Sciences and either (1) a Bachelor of Science degree from the College of Engineering or (2) a Bachelor of Fine Arts 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. The dual degree program ordinarily takes five years to complete. Students enter one of these colleges or the College of Arts and Sciences as freshmen and begin the dual degree program in the second or, in some cases, the third year. For further information students should contact Assistant Dean Rosenberg, Academic Advising Center, Goldwin Smith Hall (telephone 256-5004).

### Double Registration

Double registration in the College of Arts and Sciences and with the Cornell Law School, Cornell Medical College, or SUNY Upstate Medical Center 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 registering in the college and in one of the medical colleges listed above receive the Bachelor of Arts degree after their first year of medical studies and the Doctor of Medicine degree after the remaining three years of medical college are completed.

### 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 adviser for the course, must approve the student's program of study and agree to provide continuing supervision of the work. In one semester students may earn up to six credits with one instructor or eight credits with more than one instructor.

### Undergraduate Research Program

Students interested in participating in a faculty member's research and earning credit for the work should consult Marilyn Williams, Academic Advising Center, Goldwin Smith Hall, for a list of research projects available in the physical and biological sciences, social sciences, and the humanities. The Undergraduate Research Program has a modest budget to provide equipment and computer time for some projects.

### Intensive Language Study

More than forty languages are taught in the College of Arts and Sciences, and 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 Departments of Asian Studies, German Literature, Near Eastern Studies, Romance Studies, and Russian Literature. Semintensive 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, gaining proficiency in the language and familiarity with the culture. Cornell is the first university in the United States to set up a regular student exchange program with the People's Republic of China. 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.

### Prelaw Study

Law schools neither require nor prefer any particular program of study; they do seek students with sound training in the liberal arts. The important thing is for a student to plan a program in which he or she is interested and does 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. Many prelaw students complete four courses in this program because it interests them, not because it helps them get into law school.

Students who are interested in law should consult Assistant Dean Watson, Academic Advising Center, 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 upon 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 a particular major; they do, however, require particular undergraduate courses. Students who are interested in medical careers are urged to visit the college's Academic Advising Center and the Health Careers Office in Barnes Hall for help in planning their undergraduate program.

### Off-Campus Programs

#### Study in Absentia

Many students find it appropriate to their majors or to their overall academic programs to study abroad for one or two semesters or to study at an American institution that offers programs not available at Cornell. When it makes academic sense, the college encourages its students to study in absentia and grants credit toward the degree for work satisfactorily completed. Approximately seventy students study in absentia every year. The college sponsors very few programs abroad, but the Career Center maintains up-to-date information on hundreds of programs all over the world. Before planning a program for study in absentia, students should consult Assistant Dean Beatrice Rosenberg, in the Academic Advising Center, Goldwin Smith Hall. Advisers in the college will help students find the program most appropriate to their academic goals.

A request to study in absentia must have the support of the faculty adviser, and courses must be approved by the directors of undergraduate studies in the departments teaching those subjects. Credits earned in absentia may count as part of the 100 credits required within the College of Arts and Sciences. Normally, transfer students will not be allowed to study in absentia.

When plans are final, the student should submit the fully approved petition, together with a personal statement explaining the academic justification for the plan, to Assistant Dean Rosenberg, Academic Advising Center, Goldwin Smith Hall. When these conditions are met, in absentia status will be approved on condition that the student is in good academic standing the semester prior to in absentia study. The University charges \$15 for each semester of study in absentia, and no more than two such semesters are allowed.

### Off-Campus Residential Programs

A number of residential programs allow students to concentrate on one subject, under the instruction of Cornell faculty and other specialists in that field of study. These programs provide an opportunity to be involved in a shared academic adventure, in situations that demand discipline, hard work, cooperation, and tolerance. For students who have keen interest in the subject, the experience is an exciting, challenging component of a liberal education.

### Summer residential programs in archaeology.

During the summer months students may participate in one of the Cornell-sponsored archaeological projects in New York State, the Mediterranean region, Central America, or South America. Each project includes lectures that afford a broader understanding of the culture. The Mediterranean excavations

encompass the early Bronze Age through the Roman period. The Aegean dendrochronology project will furnish scientists and archaeologists with an exceptionally accurate dating technique. Students should contact the Department of Archaeology for information about the sites in the western hemisphere, and the Departments of Classics and Near Eastern Studies for those in the Mediterranean region.

**Marine science.** Shoals Marine Laboratory is a seasonal field station 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 taught by distinguished Cornell professors. They become familiar with the various sources of information and develop research techniques. The program also offers a unique internship program. Students who wish to serve an internship in a federal agency or congressional office 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. 10 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 term paper or several short ones, as well as practical experience. All proposals for fieldwork must be presented to the Academic Records Committee for approval. A maximum of 15 credits in fieldwork may be earned. For further information students should contact Assistant Dean Unsworth, Academic Advising Center, Goldwin Smith Hall.

## Registration and Course Scheduling

### Registration with the University

All students must register with the University at the beginning of each semester. 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

College registrar: Margery Clauson, 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 desire. Students may schedule up to 18 credits during the advance scheduling period. Information and materials will be available in the Records and Scheduling Office, Goldwin Smith Hall. Before signing into courses students should make appointments with their faculty advisers to plan their programs. Student advisers will also assist students. Any student is welcome to discuss programs and plans with an assistant dean in the Academic Advising Center, Goldwin Smith Hall. The Records and Scheduling Office issues a supplement showing last-minute changes in courses; the supplements of other divisions of the University are also available for reference in the Records and Scheduling Office. Continuing students receive their course schedules at University registration in the fall. They also receive a copy of their Permanent Record Card, which shows the courses taken, grades received, graduation requirements fulfilled, and academic actions. Copies of Permanent Record Cards are not official transcripts.

#### Limits on Course Enrollment

Students must take an average of four or five courses (15 credits) each semester in order to graduate in eight terms. At a minimum, students must carry three or four courses (12 credits); if for compelling personal or academic reasons students need to carry fewer than 12 credits, they should consult the faculty adviser and file a petition with the Committee on Academic Records. Completion of fewer than 12 credits without permission results in unsatisfactory academic standing. First-term freshmen may not register for more than 18 credits; other students may register for more than 18 credits a term only if their previous term's average was a B or higher and if their faculty advisers approve. No more than 22 credits may be taken in a regular semester.

*Any student who is not officially enrolled in a schedule of courses by the end of the third week of classes will be withdrawn from the college.*

## Special Registration Options

#### Acceleration

Earning a Bachelor of Arts degree from the College of Arts and Sciences normally takes eight semesters. Even if the minimum requirements can be met in fewer semesters, the college expects that students will remain eight semesters to take full advantage of the resources of the University. About 10 percent of the students in the college graduate in fewer than eight semesters. They do this in several ways: (a) by bringing advanced placement credit that allows them to condense the first two years and begin upper-level work before the third year, (b) by completing courses in Cornell Summer session, (c) by taking more than the average number of credits each semester. *Acceleration must be planned in advance*, it cannot result from an afterthought, nor be initiated in the senior year. Students who plan to accelerate their graduation should be accepted into their majors early so that they can spend four full semesters in upper-level work and plan their accelerated course of study with their adviser. They must petition to accelerate in their junior year. Students who decide to accelerate during their last two semesters will need to present their petitions to the Committee on Academic Records. Accelerants must, of course, satisfy all the requirements for graduation and complete at least 100 of the 120 credits with grades of C (not C–) or better.

#### Adding and Dropping Courses

After advance course enrollment, students may not add or drop courses until the new term begins. All program changes must be approved by the course instructor (or by the person designated by the appropriate department) and by the faculty adviser. During the first three weeks of the semester, course changes may be made without fees. In order to make

changes, the student picks up add/drop petitions in the Records and Scheduling Office. After the third week of classes, courses may be added only under unusual circumstances. After the eighth week, courses may be dropped only if there are extraordinary and unforeseen circumstances. For each course change approved after the third week there is a \$10 fee. Students must obtain the approval of the course instructor and the faculty adviser on the petition and turn it in to the Academic Advising Center, Goldwin Smith Hall. 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. A notation of "W" will appear on the transcript for any course dropped after the eighth week.

#### Leaves of Absence

Many students have found it useful to take time off from college to think about their goals and progress, to gain additional experiences or funds, or just to take a break from studying. Students in good standing who take a leave by the end of the seventh 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* have no conditions concerning the right to reenter the college except for the five-year limit. Readmission is automatic if a written request is made one month before the beginning of the term in which the student wishes to return.
- 2) *Medical leaves* are granted by the college only upon recommendation by a physician from Gannett Health Center. Such leaves are granted for an unspecified length of time (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.
- 3) *Conditional leaves* may be granted if the student is not in good standing or, in unusual circumstances, after the eighth 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 in academic difficulty. See Academic Actions, p. 100.

Any student who wishes to take a leave of absence should consult a member of the Academic Advising Center staff. If a student takes a leave before the end of the term, no courses taken that term will be shown on the student's record. Upon readmission, the student's graduation date will be recalculated according to the numbers of terms completed, the number of acceptable credits earned toward the degree, and the requirements for graduation. *If a student takes courses elsewhere while on leave the earned credits may be accepted as part of the 20 out-of-college credits of the 120 credits needed for graduation.*

#### Withdrawals

A withdrawal is a voluntary severance of connection with the University. If a student wishes to withdraw after registering for the term, the withdrawal must be requested before the beginning of the eighth week of classes. A notation of "W" will appear on the transcript for any course dropped after the eighth week. Upon withdrawal it is assumed that the student will not wish to reregister in the college. Students who seek readmission after withdrawing from the college appeal to the Academic Records Committee. *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 is attractive for many students whose intellectual interests change. Students who wish to transfer from one college or school at Cornell to another should discuss their eligibility with a counselor at the new school or college.

In some cases the student who wishes to transfer into the College of Arts and Sciences may transfer directly. In other cases the student may be referred to the Division of Unclassified Students. During the term immediately preceding transfer into the College of Arts and Sciences, a student 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 upon consideration of the student's entire record at Cornell and the high school record, not just the work of one term. Interested students should see Assistant Dean Unsworth, in the Academic Advising Center, Goldwin Smith Hall.

### Part-Time Study and Pro Rata Tuition

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 for fewer than 12 credits and pay pro rata tuition. 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 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.

Students who are allowed to register for part-time study in 1983-84 pay \$291.67 per credit plus the full administrative and student service fees of \$950. Students who fail to meet graduation requirements in eight semesters may petition the college to enroll in the Division of Extramural Courses.

### Forgery on Forms

Students must have course registration forms and all petitions signed by their faculty advisers. The purpose of the signature is to attest that advising has taken place. Forged signatures or credentials on college forms are an academic offense in that it interferes with advising; sometimes it constitutes academic fraud. In all cases of forgery on academic forms, the effect of the forged document shall be negated. The student may then petition properly to do whatever he or she attempted to do improperly. The incident shall be made a matter of record 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 or suspension.

### Additional Information about Courses and Credit

**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, but students must arrange for making up examinations or other work. When students will be absent because of religious holidays, they must discuss arrangements for making up their work with their instructors. Students who have to miss an examination should be sure to contact the professor.

**Transferring credit.** The college evaluates credit received from either another school or college at Cornell University or from another accredited institution of collegiate rank to determine the number of 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. (For information about language course placement and credit see pp. 94-95). No more than 60 transfer credits or sixteen courses, including 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 sixteen courses or 60 credits at Cornell; they must be in residence for four terms, not counting Summer Session.

**Advanced placement credit.** See pp. 11-14.

**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 in advance by the chairperson of the appropriate Cornell department. The college Records and Scheduling Office, Goldwin Smith Hall, can supply forms and information. Credit earned in summer courses other than those at Cornell will not count toward the 100 credits required in the college. Transcripts should be sent to the Records and Scheduling Office, Goldwin Smith Hall.

Entering students who wish to receive credit toward the degree for courses completed in a summer session at Cornell or elsewhere should have transcripts sent to the Office of Records and Scheduling, Goldwin Smith Hall, during the summer before matriculation.

**Student-Initiated courses.** The college allows students to initiate proposals for new courses or modes of instruction that are not currently offered in the college or elsewhere in the University. If the proposed course falls within the jurisdiction of a particular department, students should seek the advice of a faculty member in the department or the department chairperson. For further information students should consult the Academic Advising Center, Goldwin Smith Hall.

**Noncredit courses.** The college does not grant credit toward the degree for all courses offered by the University. Courses in remedial or developmental reading (for instance, Human Ecology 100) and mathematics, and supplemental science 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 most military training courses are among those for which credit is not given.

**Auditing.** There is no formal arrangement for auditing courses by undergraduates. Those who wish to sit in on a class ask permission of the course instructor.

**Repeating courses.** Students may repeat courses. If the instructor certifies that the course content has been changed, credit may be granted a second time. If the content has not been changed the course may be repeated to obtain a better grade, but the original grade remains on the transcript and credits for the repeated course are not counted toward graduation.

Students who plan to repeat a course should notify the Records and Scheduling Office, Goldwin Smith Hall.

## 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.

### Honors

#### Dean's List

Students must earn letter grades for at least 12 credits to qualify for Dean's List. The requirements vary according to the number of credits a student has taken during the term. Students who take only 12 credits must earn all A's. Students who take 13 or 14 credits must earn A's in at least 10 credits and B's in the rest. Students who take 15 or more credits in the term must earn A's in at least 8 credits and usually A's or B's in the rest. Students who have grades of C or C+ must have an equal number of A's beyond the minimum of 8 to balance the C's.

Students who have received a grade of U (not including a U in physical education), or a grade of C- or lower, are not qualified for the Dean's List.

**Incomplete grades.** Qualification for the Dean's List is on the basis of credits completed by the end of the term. If there is an *Incomplete* grade, the student's name will be added to the Dean's List retroactively when the *Incomplete* is made up, provided that he or she is not disqualified by the grade for the completed course.

**Two-term honors programs.** When students are in honors programs that require S or R grades at the end of the first semester, their final grades will be considered the appropriate grade for the first semester as well as the second semester. If they then qualify for the Dean's List they will be added retroactively.

**Grades that do not enter into computation.** A grade of S does not enter into the calculation, nor does the W that is awarded when a student withdraws from a course. A course graded S may not count as part of the credits for which letter grades are required. Courses for which students of the College of Arts and Sciences may not earn credit are disregarded in the calculation of the Dean's List. See the section on Noncredit Courses, above.

#### Bachelor of Arts with Honors

Almost all departments offer honors programs for students who have demonstrated exceptional ability in the discipline and who seek an opportunity to explore branches of their subject not represented in the regular curriculum or to gain experience in original investigation. 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 the degree by their major department, the Independent Major Program, or the College Scholar Program.



### Bachelor of Arts with Distinction

The degree of Bachelor of Arts with distinction in all subjects will be conferred upon students who, in addition to having completed the requirements for the degree of Bachelor of Arts, have:

- 1) completed at least sixty credits while registered in regular sessions in the College of Arts and Sciences;
- 2) received a grade of B- or better in at least three-fourths of the total number of credits taken while registered in the college;
- 3) received grades of A- or better for at least one-half of the total number of credits taken while registered in the college;
- 4) received a grade below C- in no more than one course;
- 5) received no failing grade;
- 6) maintained good standing in each of their last four terms; and
- 7) 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; if they have more than one D 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 may be considered for academic action by the Committee on Academic Records, the Committee of Deans, or one of the deans of the college.

### Academic Actions

**Warning.** Any student who fails to maintain good standing may be warned. The warning may be given informally by a committee of assistant deans in the college or it may be given formally by the faculty's Committee on Academic Records. A warning is posted on a student's Permanent Record Card but is not reported to the University registrar and does not appear on official transcripts.

**Final warning.** Students whose work is so seriously deficient that they risk being required to leave may be placed on Final Warning by the Committee on Academic Records. A final warning is posted on the student's Permanent Record Card 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. 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" is posted on the student's Permanent Record Card in the college; the University registrar is notified and "Leave of Absence" and the date will appear on the student's transcript.

**May not reregister.** The Committee on Academic Records may stipulate that a student may not reregister in the college, on the basis 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. "May not Reregister" is posted on the student's Permanent Record Card; the University registrar is notified, and "May not Reregister in the College of Arts and Sciences" and the date will appear on the official 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 evidence to present.

## Grades

### Letter Grades

See Grading Guidelines, p. 22.

### 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 within 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. A grade of S is equivalent to a grade of C- or higher, a grade of U is equivalent to any grade below C-. 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.

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 the S-U grade option may be elected, but within the 120 credits required for the degree, a minimum of 80 credits must be in courses for which a letter grade was given.

To elect the S-U option, students fill in the proper space on the optical scan forms during course enrollment. To change the grading option at the beginning of the term, students obtain a course change form from the Records and Scheduling Office, Goldwin Smith Hall, fill the form out to indicate the grade option change, and have it signed by the course instructor and their faculty adviser. The form must be returned to the Records and Scheduling Office. Students may not elect the S-U option after the third week of the term. With special permission they may change from S-U to a letter grade within the first five weeks of term, although a \$10 fee is charged after week three. Any senior planning to take a course for an S-U grade in the last semester should consult with Assistant Dean Lawrence Watson.

### Incomplete Grades

A grade of *incomplete* signifies that a course was not completed before the end of the term for reasons beyond the student's control and 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 he or she will award if the work is not completed by that date. A course will be incomplete until the instructor changes it and can remain as an *incomplete* permanently. Unless the instructor stipulates otherwise, students will be allowed one term plus one summer to make up the work. When a final grade is recorded, it is recorded with a note that this grade was formerly an *incomplete*.

### R Grades

R designates two-semester or year-long courses. The R is recorded on the student's Permanent Record Card 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 unless alternative addresses are reported to the college or University registrar by mid-May.

The college does not compute term grade-point averages, cumulative averages, or class rank.

## Advising

The following advisers and offices are here to provide information on college procedures and regulations, academic advising, or counseling.

### Faculty Advisers

Faculty advisers help students design programs of study and advise students about ways to achieve their academic goals. Faculty members volunteer to act as advisers to new students in the college; advisers and advisees meet during orientation week to plan the student's program. Students are encouraged to see their advisers again early in the term, before it is too late to drop courses and before signing into courses for the following term, 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 must approve each semester's program and any course changes. Students who would like to petition for an exception to college rules should discuss the matter with their advisers; the adviser must review and sign the petition before it may be acted upon.

Advisers may also help students with study or personal problems or 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 decisions at Cornell. The adviser must approve the student's course of study and eventually certify the completion of the major. The major adviser should be consulted by the student about all academic plans, including such aspects as 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

Glenn Altschuler, assistant dean, freshmen  
Beatrice G. Rosenberg, assistant dean, sophomores  
Margaret C. Unsworth, assistant dean, juniors  
Lawrence Watson, assistant dean, seniors  
Janice P. Turner, assistant dean for minority affairs

The Academic Advising Center, Goldwin Smith Hall, serves as a resource for faculty and student advisers and for students themselves. The center's advisers are available to help students define their academic and career goals and to help with specifics such as study abroad programs, field work, etc., and they welcome all questions relating to the college.

## 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.)

#### Akkadian

See Department of Near Eastern Studies, p. 174.

#### American Studies

S. C. Strout, chairman and director of undergraduate studies (110 Rocketteller Hall, 256-4611); M. J. Colacurcio, R. L. Moore, R. Polenber, F. Somkin

##### The Major

The major in American studies is basically a program of coordinated study in the history and literature of the United States. It is not a "double major." The prerequisites are minimal: one course in British or American history at the 100 or 200 level and one course in British or American literature at the 200 level. The major itself is structured and demanding, and students who expect to become American studies majors should apply to the chairman 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 an account of the nation's development can be divided, defined for the purposes of the program as colonial, nineteenth century, and twentieth century. In order 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 specially designated 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, and 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 (a) 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 (b) take an oral examination in the declared area of special interest.

### Anthropology

A. T. Kirsch, chairman; P. S. Sangren, director of undergraduate studies (205 McGraw Hall, 256-5137); R. Ascher, J. A. Boon, V. R. Dyson-Hudson, C. J. Greenhouse, D. J. Greenwood, J. S. Henderson, D. H. Holmberg, B. J. Isbell, L. C. Jackson, B. Lambert, T. F. Lynch, K. S. March, C. Morris, J. T. Siegel, R. J. Smith, J. Wylie

Anthropology grew out of curiosity about the ways past and present human societies have differed and have been similar. As a craft, anthropology has developed and borrowed many strategies to approach these differences and uniformities. Some are archaeological, concerned with cultures long gone or destroyed by the spread of empires. Others are sociocultural, dealing with recent and contemporary rural and urban societies in all areas of the world through a variety of social scientific and humanistic techniques. Still others are biological and evolutionary, stressing human evolution and biological uniformity and diversity. In-depth field studies, excavations, laboratory analysis, the interpretation of symbol systems, and varieties of comparative methodologies are all part of anthropology.

Five introductory courses offer choices among the different strategies for doing anthropology. Four (112, 113, 114, and 116) explore major strategies for doing anthropology, lessons learned so far, and questions still pending. Nature and Culture (Anthropology 111) focuses on the fundamental questions raised by all these approaches to anthropology—the issues that form the core of our concerns as anthropologists. The other departmental offerings deepen and broaden this basic knowledge. All anthropology courses with numbers below 500 are open to all students unless otherwise stated in the course description.

##### The Major

The student who majors in anthropology must:

- 1) Take two courses at the 100 level: one in sociocultural anthropology (either 111, 112, or 113) and one in biological anthropology or anthropological archaeology (either 114 or 116), preferably during the freshman or sophomore years. (Freshman Seminars in anthropology do not fulfill this requirement.)
- 2) Take anthropology 300, The Discipline of Anthropology, no later than the fall term of the junior year.
- 3) Take at least one course in each of four of the following five categories: Category III, Archaeological Courses; Category IV, Biological and Ecological Anthropology; Category V, Sociocultural Anthropology; Category VI, Theory and History of Anthropology; Category VII, a course that focuses on some world area.
- 4) 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, area studies, and biological and ecological anthropology. Students interested in any of these specializations must consult with the director of undergraduate studies, who will refer them to an appropriate academic

adviser. When appropriate, special provisions for meeting major requirements may be arranged with the adviser's approval.

- 5) Take a total of 32 credits of course work, in addition to Anthropology 300, beyond the introductory level. Up to 12 credits of course work in cognate disciplines (see Category VIII) related to the student's specialization may be accepted for the major with the permission of the faculty adviser.

**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.

### 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.

### I. Introductory Courses (Including Freshman Seminars)

**111 Nature and Culture** Spring, 3 credits (4 by arrangement with instructor).

M W F J. Wylie.  
Anthropology arose as a novel attempt to address fundamental questions about humanity: Who are we? Where do we come from? Where are we going? Though it does not provide privileged answers to these questions, it approaches them through a unique combination of methods and a spirit of comparative inquiry. Informed by the long view gotten from the study of human evolution and culture history, and the comparative view arising from the study of contemporary human biological and cultural diversity and uniformity, anthropology aspires to examine the relationships between the physical/biological and symbolic/moral worlds in which we live. This course examines a variety of past and current attempts to explain the relationships between nature and culture in human life.

**112 Social Anthropology** Fall, 3 credits (4 by arrangement with instructor).

M W F 12:20. J. Wylie.  
Among the ways they study human life, anthropologists examine social institutions in terms of their relationship to culture. Social anthropology is the study of social relationships and the ideas about existence implicit in them. In the course, we consider institutions—family, government, economics, religion, and so on—as contexts that define and are defined by social interactions. We explore the world's cultural diversity as well as the question of what cultural differences mean. Most of the readings are firsthand accounts by ethnographers; films and discussions supplement the lectures.

**113 The Comparison of Cultures** Spring. 3 credits (4 by arrangement with instructor).

T R 10:10–11:25. 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 forms 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.

**114 Humankind: The Biological Background** Fall. 3 credits (4 by arrangement with instructor).

M W F 11:15. R. Dyson-Hudson.

Anthropological inquiries about human origins, biocultural diversity, and behavior require an understanding of the causes and effects of evolution. This survey of biological anthropology examines controversies about human origins and antiquity, human adaptations to past environments, sociobiology, biological variability in ancient and modern populations, and the basis for the evolution of diversity of cultural behaviors. Lectures are supplemented with films, laboratory and discussion sections, and guest lecturers.

**116 Ancient Societies** Fall. 3 credits (4 by arrangement with instructor).

M W F 10:10. J. S. Henderson.

An introduction to anthropological archaeology using case studies to illustrate the reconstruction of ancient societies. Cases represent a variety of geographic areas and levels of cultural complexity, including hunting bands, farming villages, kingdoms without cities, and urban empires. The course illustrates processes of archaeological reasoning and provides a perspective for evaluating popular ideas about cultural evolution.

**130 Apes and Languages** Fall and spring. 3 credits. Freshman Seminar.

M W F B. J. Isbell.

Extraordinary claims have been made about the language capacities of chimpanzees and gorillas. Are the apes talking? How does the sign language that has been taught to apes compare with natural spoken language of human beings? A selection of popular and scholarly books and articles are examined in order to better understand the key issues in the debate over the language capacities of apes. This Freshman Seminar is designed to teach students the skills of critical writing. There are no "correct" answers to most of the issues raised in this course. Students will read and discuss both sides of issues and develop arguments. Weekly writing assignments will range from one paragraph to two or three pages.

**[150 The Discovery of America** Spring. 3 credits. Freshman Seminar. Not offered 1983–84.]

**205 Ethnographic Films** Fall and spring. 2 credits.

W 7:30–9 p.m. B. J. Isbell.

Human cultural and social variability is explored through a series of ethnographic films, and readings and lectures relating to these films. The films are chosen to show peoples living in a variety of ecological situations and at different levels of social complexity in various parts of the world (i.e., Africa, Asia, Australia, the Americas). Readings and lectures will use the concepts and theories of cultural anthropology to interpret the significance of the different modes of life shown in the films.

## II. Courses Intended Primarily for Majors

**300 The Discipline of Anthropology** Fall. 4 credits. Limited to, and required of, anthropology majors, who must take this course no later than the fall term of the junior year.

M W F 3:35. A. T. Kirsch, with the anthropology faculty

The course is an overview of the field of anthropology; it provides a systematic treatment of the discipline, the concepts that are used, the persistent questions that are asked, the specializations within the field, and the shared goals and differing viewpoints. The course is intended to help majors plan their course work.

**491 Honors Thesis** Fall. 4 credits. Prerequisite: consent of the Honors Committee. Intended for majors graduating in midyear.

Hours to be arranged. Staff.

Independent work under the close guidance of a faculty member selected by the student.

**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.

**495 Social Relations Seminar (also Sociology**

**497)** Spring. 4 credits. Limited to seniors majoring in social relations.

Hours to be arranged. Staff.

**497–498 Topics in Anthropology** 497, fall; 498, spring. Credit to be arranged.

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.

**203 Early People: Human Cultural and Biological Evolution (also Archaeology 203)** Fall. 3 credits.

T R 1–2:15. T. P. Volman.

This course surveys the archaeological and fossil record of human evolution. Contributions by researchers from a variety of scientific disciplines are highlighted, as well as 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. Laboratory sessions and films supplement the lectures.

**[250 The Earliest Civilizations** Fall. 4 credits. Not offered 1983–84.]

**352 Interpretation of the Archaeological Record** Fall. 4 credits.

T R 2:30–3:45. C. Morris

Basic principles and procedures of archaeological data collection and analysis considered in the context of modern archaeological theory. Problems of sampling the description and statistical treatment of artifacts, and the development of practical archaeological research designs are among the topics covered.

**354 The Peopling of America** Fall. 4 credits.

M W F 9:05. 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.

**355 Archaeology of Mexico and Central America** Spring. 4 credits.

M W F 9:05. J. S. Henderson.

A consideration of the origins, development, and spread of the Olmec, Maya, Aztec, and other native civilizations of Mexico and Central America. Prehistoric cultural developments from the emergence of settled farming life, through the rise of states, to the European conquest of the Aztecs will be emphasized.

**356 The Archaeology of South America** Spring. 4 credits.

T R 8:40–9:55. T. F. Lynch.

Origins and development of South American agriculture and civilization, with special attention to Peru, the Andean heartland, and diffusion into the lowland forests and Caribbean. Major topics include the domestication of plants and animals, the rise of temple-based cults and great art styles, the formation of militaristic states, regional interaction and the Inca empire, and the possibility of transoceanic influences.

**[358 Archaeological Research Methods (also Archaeology 358)** Spring. 4 credits. Not offered 1983–84.]

**[361 Field Archaeology in South America (also Archaeology 361)** Spring. 10 credits. Not offered 1983–84.]

**[435 Investigation of Andean Institutions: Archaeological Strategies** Spring. 4 credits. Not offered 1983–84.]

**[493 Seminar in Archaeology: The Maya** Fall. 4 credits. Not offered 1983–84.]

**494 Seminar in Archaeology: Settlement Archaeology** Spring. 4 credits.

T 2:30–4:25. J. S. Henderson.

Archaeological approaches to ancient settlements. Analysis of households, neighborhoods, communities, and regions. Emphasis is on strategies of field investigation and analytical methods.

## IV. Biological and Ecological Anthropology

**[221 Human Biology: Variation and Adaptations of Contemporary Populations** Fall. 4 credits. Not offered 1983–84.]

**375 Ecology and Human Biology** Fall. 4 credits.

M W F 2:30. R. Dyson-Hudson.

An analysis of human interactions with the physical, biological, and social environment, based on the principles of general ecology. Changes over time in human interactions with the environment will be discussed, as well as differences in adaptive strategies of contemporary human groups living in similar and different environments.

**[476 Human Behavior: An Evolutionary Perspective** Spring. 4 credits. Not offered 1983–84.]

## V. Sociocultural Anthropology

**422 American Indian Philosophies I: Power and World Views (also Rural Sociology 242)** Fall. 3 credits. Prerequisites: Anthropology 242 and permission of instructor.

T R 2:30–3:45. S. C. Saraydar.

This course is designed to facilitate an understanding of the world views of American Indians of the past and present. The philosophies of contemporary figures such as Lone Deer, Deloria, Momaday, and the enigmatic Don Juan are evaluated along with those of Black Elk, Handsome Lake, and other Indians of earlier times. 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.

**301 Biology and Society I: The Biocultural Perspective (also Biological Sciences 301 and Biology and Society 301)** Fall. 3 credits (4 by arrangement with instructor). Prerequisite: one year of introductory biology. This is part of the two-semester core course for the biology and society major and is also open to other students who have fulfilled the necessary prerequisite.

T R 8:40–9:55. D. J. Greenwood.  
Viewing human biology, behavior, and institutions as the ongoing products of the interactions between human biological evolution and cultural change, this course documents these interactions with reference to the following topics: the evolution of the capacity for culture; human groups and institutions; language, meaning, and cultural "realities"; and major models of human nature and human institutions.

**[305 Psychological Anthropology]** Fall. 4 credits. Not offered 1983–84.]

**312 Issues in Biology and Society: The Anthropology of Medicine (also Biology and Society 312)** Spring. 4 credits. Prerequisites: Anthropology/Biological Sciences/ Biology and Society 301 or permission of instructor.

R 2:30–4:30. D. J. Greenwood, D. H. Holmberg.  
An examination of contemporary medical systems from an anthropological perspective and an evaluation of current approaches to the anthropology of medicine.

**313 Urban Anthropology** Spring. 4 credits. M W F 9:05. R. J. Smith.

An examination of the sociocultural structure and process in urban settings, with emphasis on the role of rural migrants, the relationship of urbanism to political and economic development, the role of voluntary associations, and the adjustment of family and kinship groups to urban life. Asian, African, and Latin American urban centers are emphasized.

**314 Applied Anthropology** Fall. 4 credits. T R 10:10–11; 50-minute sec to be arranged. M. L. Barnett.

What anthropology knows or suspects about some general processes of cultural change, and the application of these insights to practical and ethical problems faced in the planning, conduct, and evaluation of programs of intervention and change.

**[320 Meaning across Cultures]** Spring. 4 credits. Not offered 1983–84.]

**321 Sex and Gender in Cross-Cultural Perspective (also Women's Studies 321)** Fall. 4 credits.

M W F 2:30. K. S. March.  
An introduction to the study of sex roles cross-culturally and to anthropological theories of sex and gender. The course examines various aspects of the place of the sexes in social, political, economic, ideological, and biological systems to emphasize the diversity in gender and sex-role definition around the world.

**322 Comparative Religious Systems** Spring. 4 credits.

T R 1:25–2:15; 50-minute sec to be arranged. A. T. Kirsch.  
A survey of anthropological approaches to the study of religion in simple and complex societies. Examines the role of religion in addressing intrinsic strains in personal and social life and in inhibiting or inducing social and cultural change.

**323 Kinship and Social Organization** Spring. 4 credits.

M W F 11:15. B. Lambert.  
Much of this course is a survey of forms of the family, descent groups, and marriage systems. The role of age and sex in the social structure is also considered. The last part of the course is devoted to a history of the British and American family and to its fate in utopian communities.

**325 Images of Exotics** Fall. 4 credits. T R 10:10–11:25. J. A. Boon.

A survey of texts and contexts in European explanations of tribal, Indic, and other non-Western populations. We explore topics across ancient, medieval, Renaissance, Enlightenment, and Romantic-comparativist anthropologies, including monstrosities, paradise, degradation, kingship, utopias, hermetics, nature, sexuality, marriage, language, economy, descent, authority, and so forth.

**[326 Economic Anthropology]** Fall. 4 credits. Not offered 1983–84.]

**[328 Law and Culture]** Fall. 4 credits. Not offered 1983–84.]

**[329 Power and Culture]** Spring. 4 credits. Not offered 1983–84.]

**367 American Indian Tribal Governments (also Rural Sociology 367)** Fall. 4 credits. Prerequisites: Agricultural and Life Sciences 100 or Anthropology 230, or permission of instructor.

W 7:30–9:55 p.m. S. C. Saraydar.  
This course focuses on the structure of contemporary tribal governments and the ways in which these governments approach the issues confronting their constituents. The effects of European contact on traditional political organizations are detailed as are the present-day relations of tribal governments to federal and state governments.

**422 Special Problems in the Anthropology of Sex and Gender (also Women's Studies 422 and Biology and Society 406)** Fall. 4 credits.

R 2:30–4:25. K. S. March.  
Each year this seminar focuses on a particular area in the anthropology of sex and gender, building on work done in Anthropology/Women's Studies 321. The topic for fall 1983 will be women in international development. The seminar will look at the integration of women into development planning and projects: the confrontation between the feminisms of developing and developed countries, political rights and participation, land reform, credit, agricultural extension services, technological change, small and landless farmers, migration, informal marketing, domestic service, cottage industry, multinational industry, legal reform, education, family planning, fertility, and infant formulas. Overall, the seminar pivots around the question of how much Western sexual and family norms, as well as preconceptions about the place of men and women in the public sector, lie at the heart of Western models for development intervention.

**424 Myth, Ritual, and Sign** Fall. 4 credits.

T R 10:10–11:25. J. T. Siegel.  
We will treat myth, ritual, and sign in their theoretical and practical dimensions, looking at them in the views of various social theorists and as described by ethnographers.

**[427 The Anthropology of Everyday Life]** Fall. 4 credits. Not offered 1983–84.]

**442 American Indian Philosophies II: Selected Topics (also Rural Sociology 442)** Spring. 4 credits. Prerequisites: Anthropology/Rural Sociology 242 and permission of instructor.

W 7:30–9:25 p.m.; additional sessions to be arranged. S. C. Saraydar.  
This course provides an opportunity for students to pursue topics of interest from American Indian Philosophies I in greater depth. The specific topics to be investigated will be selected by the students in consultation with the instructor before the beginning of the semester.

**451 Anthropological Boundaries** Fall. 4 credits. Enrollment limited to 15. S-U grades only.

R 2:30–4:25. R. Ascher.  
A search for connections between the creative arts and anthropology. Works by anthropologists, native artists, and Western artists who sense a kinship with

anthropological questions are included. The novel, cinema, and poetry receive attention, as do photography, dance, music, theatre, sculpture, and imaginary fiction. About half the course draws upon native North America. The rest is divided between Africa, Europe, and the contemporary United States. *Henderson the Rain King*, *Threepenny Opera*, and two movies about Navajos—one by commercial filmmakers and the other by Navajos—are examples of readings, listening, and viewings. The course concludes with discussion of Buber's anthropological essay *What is Man?*

**452 Portraits, Profiles, and Life Histories** Spring. 4 credits. Enrollment limited. S-U grades strongly recommended.

R 2:30–4:25. R. Ascher.  
The goal is the creation, by each student, of a portrait, profile, or life history of one other person. Ideally, that other person should differ from oneself in background and age or in other significant ways. Freedom is granted—and experimentation is encouraged—in the form of observation, recording, and presentation. As a point of departure, a study is made of books such as *Group Portrait with Lady* and *A Fortunate Man*. Portraits on film include *Sam and Betty Tells Her Story*. The photography of Arbus, the sculpture of Giacometti, and the painting of Katz are examined critically. The second half of the semester is devoted to one-hour critiques of the work of each student.

**[453 Constructions and Visualizations]** Fall. 4 credits. Not offered 1983–84.]

**[454 The Anthropologist's America: Expository and Creative Writing]** Spring. 4 credits. Not offered 1983–84.]

**[455 Theatre of Anthropology]** Spring. 4 credits. Not offered 1983–84.]

## VI. Theory and History of Anthropology

**306 Ethnographic Description** Spring. 4 credits. T R 10:10–11:25. 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 movie viewing, listening to music, and playing video games, will be looked at for the role they play in education. The place of money and commodities will also be examined.

**412 Contemporary Anthropological Theory** Fall. 4 credits.

M W F 11:15. B. Lambert.  
A survey of the assumptions social anthropologists make concerning the nature of society and culture, and the explanations they have proposed for regularities in social behavior, values, and belief systems. Among the approaches considered are processual analysis, the use of the concept of transaction, the historical method, ethnohistory, and structuralism.

**[413 History of Anthropology in the United States]** Fall. 4 credits. Not offered 1983–84.]

**[417 Structuralism]** Spring. 4 credits. Not offered 1983–84.]

**[420 Development of Anthropological Thought]** Spring. 4 credits. Not offered 1983–84.]

**425 Ritual Structures and Cultural Pluralism** Fall. 4 credits.

T 2:30–4:30. J. A. Boon.

The course focuses on Indonesia and other areas with Hindu-Buddhist and Islamic religious traditions. We examine ethnographies and novels that portray complexities of ritual, marriage, rank, and ethnic, religious, or cross-clan stereotypes. Colonial and postcolonial works by Bateson, Hocart, Rassers, Geertz, Dumont, Multatuli, Forster, and others are considered.

## VII. Area Courses

### 230 Cultures of Native North America Fall. 4 credits.

M W F 1:25. B. Lambert.

A survey of the principal Eskimo and American Indian culture areas north of Mexico. Selected cultures will be examined to bring out distinctive features of the economy, social organization, religion, and world view. Although the course concentrates on traditional cultures, some lectures and readings deal with changes in native ways of life that have occurred during the period of European-Indian contact.

### 318 Ethnohistory of the Northern Iroquois (also Agriculture and Life Sciences 318) Spring. 3 credits. (4 by arrangement with instructor).

T R 2:30–3:45. S. C. Saraydar.

The development of Northern Iroquoian culture patterns is examined in depth from the prehistoric Woodland period to the present day. Archaeological and ethnographic data are critically evaluated and combined, both to trace the history of the Iroquois people and to enable their cultural ecology to be reconstructed. Supplemental information is drawn from accounts of neighboring groups in southern Ontario and western New England to provide a regional perspective and to fill gaps in the chronicles of the early contact period.

### [331 The United States Spring. 4 credits. Not offered 1983–84.]

### [333 Ethnology of the Andean Region Fall. 4 credits. Not offered 1983–84.]

### 334 Ethnology of Island Southeast Asia Fall. 4 credits.

M W F 3:35. 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.

### [335 Ethnology of Mainland Southeast Asia Fall. 4 credits. Not offered 1983–84.]

### [336 Ethnology of Oceania Fall. 4 credits. Not offered 1983–84.]

### [342 Culture and Society in South Asia Fall. 4 credits. Not offered 1983–84.]

### [343 Religion, Family, and Community in China Spring. 4 credits. Not offered 1983–84.]

### 345 Japanese Society Fall. 4 credits.

M W F 9:05. 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.

### [432 Indians of Mexico and Central America Spring. 4 credits. Not offered 1983–84.]

### [433 Andean Thought and Culture Spring. 4 credits. Not offered 1983–84.]

### 456 Mesoamerican Thought Fall. 4 credits.

T 12:20–2:15. J. S. Henderson.

An introduction to iconography and writing systems in ancient Mexico and Central America. Emphasis is on inscriptions and painted books as sources for the reconstruction of Maya religion and history.

## VIII. Related Courses in Other Departments

### Introduction to Archaeology (Archaeology 100)

### Popular Archaeology (Archaeology 107)

### Individual Study in Archaeology and Related Fields (Archaeology 300)

### Human Paleontology (Biological Sciences 371)

### Laboratory and Field Methods in Human Biology (Biological Sciences 474)

### Human Growth and Development: Biological and Social-Psychological Considerations (Nutritional Sciences and Human Development and Family Studies 347)

### Interpersonal and Social Stress and Coping (Psychology 486)

### Subsistence Agriculture in Transition (Rural Sociology 357)

### Cross-Cultural Psychology (Sociology 384 and Psychology 384)

## IX. Graduate Seminars

600-level courses are open to undergraduates who have fulfilled the prerequisites or by consent of the instructor.

### Southeast Asia Seminar: Malaysia (Asian Studies 601)

### Southeast Asia Seminar: Indonesia (Asian Studies 602)

### Contemporary Sociological Theories of Development (Rural Sociology 606)

### 607–608 Special Problems in Anthropology 607, fall; 608, spring. Credit to be arranged.

Hours to be arranged. Staff.

### [610 Myth and Mythology (also Classics 610) Spring. 4 credits. Not offered 1983–84.]

### [611 Principles of Social Anthropological Theory Spring. 4 credits. Not offered 1983–84.]

### [612 History of Anthropological Thought Spring. 4 credits. Not offered 1983–84.]

### Methods of Assessing Physical Growth in Children (Nutritional Sciences 612)

### 619 Anthropological Approaches to the Study of Buddhism in Asia Fall. 4 credits.

W 1:30–3:30. 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.

### [626 Problems in Economic Anthropology Spring. 4 credits. Not offered 1983–84.]

### [627 Legal Anthropology Fall. 4 credits. Not offered 1983–84.]

### 628 Political Anthropology (also Government 647) Spring. 4 credits.

F 2:30–4:30. J. T. Siegel, B. R. O'G. Anderson.

A comparison of political rhetoric in the Indonesian Old and New Orders. The bearing of such phenomena as newspapers, magazines, television, and various types of theater, music, and fiction on the shaping of accommodation or opposition to the political order will be examined. A reading knowledge of Indonesian is required.

### [630 Andean Systems of Production Spring. 4 credits. Not offered 1983–84.]

### Anthropometric Assessment (Nutritional Sciences 630)

### 632 Andean Symbolism Fall. 4 credits.

Prerequisite: Reading knowledge of Spanish.

Hours to be arranged. B. J. Isbell, C. Morris.

Various approaches to symbolism will be applied to archaeological data from the Andean region: architecture and site plans, and the iconography on textiles and ceramics will be discussed.

### [633 Andean Research Fall or spring. 4 credits. Not offered 1983–84.]

### 634–635 Southeast Asia: Readings in Special Problems 634, fall; 635, spring. Credit to be arranged.

Hours to be arranged. M. L. Barnett, J. A. Boon, A. T. Kirsch, J. T. Siegel.

### 645 Japanese Ethnology Spring. 4 credits.

R 2:30–4:30. 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.

### [651 Anthropological Boundaries: Graduate Spring. 4 credits. Not offered 1983–84.]

### 653 Myth onto Film (also Theatre Arts 653) Fall and spring. 4 credits. Open to undergraduates and graduate students with permission of the instructor. Prerequisite: some knowledge of any one of the following: anthropology, film, graphics, drawing, and painting.

T 1:25–4:25. 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.

### 663 Problems in Archaeology: Agricultural Origins Fall. 4 credits.

T 2:30–4:25. T. F. Lynch.

The topic will be considered in historical perspective as it has been dealt with by botanists, geographers, and anthropologists. The emphasis will be on agricultural systems rather than plant or animal morphology and taxonomy. The geographical focus will be South America, with special attention to the Andes.

### 664 Problems in Archaeology: Early Man in America Spring. 4 credits. Prerequisite: Anthropology 354 or permission of instructor.

M 2:30–4:25. T. F. Lynch.

The subject will be considered in historical perspective as it has been dealt with by archaeologists, geologists, 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.

### [666 The Discovery of America Fall. 4 credits. Not offered 1983–84.]

### [667 Origins of Mesoamerican Civilization Spring. 4 credits. Not offered 1983–84.]



**677 Topics in Ecological Anthropology** Fall. 4 credits.

R 3-5. R. Dyson-Hudson.

The adaptive relations between specific groups of foragers and agriculturalists and the food-producing sectors of their habitat will be analyzed. The relation between variables of human social organization such as settlement size, kinship relations, social stratification, and spatial organization and features of the environment will be examined through reading current articles and monographs.

**Introduction to Ethnomusicology (Music 680)****[681 Topics in Biomedical Anthropology** Spring 4 credits. Not offered 1983-84.]**901-902 Field Research** 901, fall; 902, spring. Credit to be arranged.

Hours to be arranged. Staff.

## Arabic and Aramaic

See Department of Near Eastern Studies, p. 173.

## Archaeology

J. S. Henderson (anthropology), director; A. L. Bloom (geological sciences), R. G. Calkins (history of art), K. M. Clinton (Classics), J. E. Coleman (Classics), R. T. Farrell (English), P. I. Kuniholm (Classics), T. F. Lynch (anthropology), C. Morris (anthropology), G. W. Olson (agronomy), D. I. Owen (Near Eastern studies), A. Ramage (history of art), B. S. Strauss (history), T. P. Volman (archaeology), J. M. Weinstein (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**

The basic introductory course for both majors and nonmajors is Archaeology 100. Those with a fairly serious interest in the field, particularly prospective majors, are encouraged to take the optional one-hour section, Archaeology 101. This course covers the broadest range of archaeology in terms of area and time, and deals with method as well as results. Since the major draws upon the teaching and research interests of faculty from many departments in order to present a broad view of the archaeological process, a student interested in the archaeology major should discuss his or her 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.

As prerequisite to the major a student must complete Archaeology 100. Once admitted to the major, the student must take an additional 36 credits in courses from the archaeology list, chosen in consultation with the major adviser. These courses should provide exposure to a broad range of archaeologically known cultures and the methods of revealing and interpreting them. They must be distributed as follows:

- 1) At least two courses from each of the categories below (totaling at least 30 credits, including 16 at the 300 level or above):  
Theory and Interdisciplinary Approaches (B)  
Old World Archaeology (C)  
New World Archaeology (D)
- 2) At least two courses from Related Courses (E)

**Honors.** Honors in archaeology is awarded on the basis of the quality of an honors essay and the student's overall academic record. Candidates for the honors program 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 300 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 Seminars****107 Popular Archaeology** Fall and spring. 3 credits. Freshman Seminar.

Sec 1, M W F 1:25; (fall only) A. Wonderley. Sec 2, T R 1-2:15; (fall and spring) M. Anders.

Examines the scientific basis for controversial interpretations of prehistory that have gained wide public acceptance. Readings include both popular and scholarly works. Careful and critical analysis of archaeological evidence is emphasized.

**[108 The Origins and Diversity of the Family in Antiquity** Not offered 1983-84]**[109 Archaeoastronomy** Not offered 1983-84]**[111 Indian Lifeways of Ancient North America** Not offered 1983-84.]**[The Discovery of America (Anthropology 150)** Not offered 1983-84.]**Freshman Seminar in Classical Archaeology (Classics 121)**

For description see Classics Department listing.

**A. Introductory Courses and Independent Study Courses****100 Introduction to Archaeology** Spring. 3 credits.

M W F 1:25. T. P. Volman.

A broad introduction to archaeology—the study of material remains to answer questions about the human past. The history, methods, and theory of archeology are presented, followed by a survey of the archaeological record from human origins, through the development of food production, to the rise and spread of civilizations. Guest lectures by members of the Cornell Archaeology Program are an integral part of the course.

**101 Introduction to Archaeology, Section** Spring 1 credit. 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.

R 12:20-1:10. T. P. Volman.

A series of practical and special topics. The section includes exposure to archaeological materials, an introduction to mapping and recording, special lectures by Cornell faculty and outside visitors, and visits to campus research facilities.

**300 Individual Study in Archaeology and Related Fields** Fall and 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.

**Independent Study: Ancient Israel (Near Eastern Studies 449)****B. Theory and Interdisciplinary Approaches****203 Early People: Human Cultural and Biological Evolution (also Anthropology 203)** Fall. 3 credits.

T R 1-2:15. 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. Laboratory sessions and films supplement the lectures.

**[281 History of Archaeology** Not offered 1983-84]**317 Method and Theory in Stone Age Archaeology** Fall. 4 credits

T R 10:10-11:25. T. P. Volman.

An introduction to research on the archaeological record of Stone Age peoples. Current multidisciplinary approaches and theoretical orientations are presented. Case studies are used to demonstrate excavation procedures, research design, and the potential of the long Stone Age record for providing information on the evolution of prehistoric lifeways and behaviors.

**[358 Archaeological Research Methods (also Anthropology 358)** Not offered 1983-84]**[401 Evolution of Prehistoric Technology** Not offered 1983-84.]**Ancient Societies (Anthropology 116)** Fall.**[The Earliest Civilizations (Anthropology 250)** Not offered 1983-84]**Interpretation of the Archaeological Record (Anthropology 352)** Fall**[Investigation of Andean Institutions: Archaeological Strategies (Anthropology 435)** Not offered 1983-84.]**[Seminar in Archaeology (Anthropology 493)** Not offered in 1983-84.]**Seminar in Archaeology: Settlement Archaeology (Anthropology 494)** Spring.**Problems in Archaeology: Agricultural Origins (Anthropology 663)** Fall.**Problems in Archaeology: Early Man in America (Anthropology 664)** Spring**[Architectural Problems in Archaeological Fieldwork (Architecture 540)** Not offered 1983-84.]**Dendrochronology of the Aegean (Classics 309)** Fall.**Geomorphology (Geological Sciences 345)** Fall.**[Ceramics (History of Art 423)** Not offered 1983-84]

**C. Old World Archaeology**

[309 Archaeology of Africa: From Human Origins to Iron Age States Not offered 1983-84 ]

[Rise of Classical Greece (Classics 206) Not offered 1983-84 ]

Introduction to Art History: Art of the Classical World (Classics 220 and History of Art 220) Fall

[Minoan-Mycenaean Art and Archaeology (Classics 221 and History of Art 221) Not offered 1983-84 ]

Archaeology in Action I (Classics 232) Fall

Archaeology in Action II (Classics 233) Spring.

[Arts and Monuments of Athens (Classics 320 and History of Art 320) Not offered 1983-84 ]

[Archaeology of Cyprus (Classics 321 and History of Art 321) Not offered 1983-84 ]

[Greek Architecture (Classics 328) Not offered 1983-84.]

[Greek Sculpture (Classics 329 and History of Art 329) Not offered 1983-84.]

Seminar in Classical Archaeology (Classics 629) Fall.

[Seminar in Classical Greek Archaeology (Classics 630) Not offered 1983-84 ]

[Arts of the Roman Empire (History of Art 322) Not offered 1983-84.]

Painting in the Greek and Roman World (History of Art 323 and Classics 323) Spring.

Greek and Roman Coins (History of Art 327 and Classics 327) Fall.

[Art in Pompeii: Origins and Echoes (History of Art 330) Not offered 1983-84 ]

[The History and Archaeology of Ancient Israel (Near Eastern Studies 243) Not offered 1983-84 ]

[Introduction to Art History: Art of Egypt and Mesopotamia (Near Eastern Studies 248 and History of Art 211) Not offered 1983-84 ]

[Ancient Seafaring (Near Eastern Studies 261 and Archaeology 275) Not offered 1983-84 ]

Interconnections in the Eastern Mediterranean World in Antiquity (Near Eastern Studies 361) Fall.

History and Archaeology of Ebla (Near Eastern Studies 362 and Archaeology 362) Spring.

The History and Archaeology of the Ancient Near East (Near Eastern Studies 366 and Archaeology 310) Fall

[History and Archaeology of Ancient Egypt (Near Eastern Studies 367) Not offered 1983-84 ]

**D. New World Archaeology**

[361 Field Archaeology in South America (also Anthropology 361) Not offered 1983-84 ]

The Peopling of America (Anthropology 354) Fall

Archaeology of Mexico and Central America (Anthropology 355) Spring

The Archaeology of South America (Anthropology 356) Spring.

Mesoamerican Thought (Anthropology 456) Fall

[Andean Systems of Production (Anthropology 630) Not offered 1983-84 ]

Andean Symbolism (Anthropology 632) Fall

[Andean Research (Anthropology 633) Not offered 1983-84 ]

[Origins of Mesoamerican Civilization (Anthropology 667) Not offered 1983-84 ]

**E. Related Courses for Archaeology Majors**

Plane Surveying (Agricultural Engineering 221)

Nature and Properties of Soils (Agronomy 260)

Identification, Appraisal, and Geography of Soils (Agronomy 361)

Geography and Appraisal of Soils of the Tropics (Agronomy 471)

Use of Soil Information and Maps as Resource Inventories (Agronomy 506)

[Morphology, Genesis, and Classification of Soils (Agronomy 663) Not offered 1983-84 ]

American Indian Philosophies I: Power and World Views (Anthropology 242 and Rural Sociology 242)

Ethnohistory of the Northern Iroquois (Anthropology 318 and Agriculture and Life Sciences 318)

[Ethnology of the Andean Region (Anthropology 333) Not offered 1983-84.]

[Ethnology of Oceania (Anthropology 336) Not offered 1983-84 ]

American Indian Tribal Governments (Anthropology 367 and Rural Sociology 367)

[Indians of Mexico and Central America (Anthropology 432) Not offered 1983-84 ]

[Andean Thought and Culture (Anthropology 433) Not offered 1983-84 ]

American Indian Philosophies II: Selected Topics (Anthropology 442 and Rural Sociology 442)

[Discovery of America (Anthropology 666) Not offered 1983-84 ]

Introductory Photo I (Architecture 251 and Art 161)

Color Photography (Architecture 350 and Art 263)

Introductory Photo II (Architecture 351 and Art 261)

Case Studies in Preservation Planning (Architecture 544)

Documentation for Preservation Planning (Architecture 546)

Remote Sensing: Environmental Applications (Civil and Environmental Engineering 611)

Image Analysis I: Landforms (Civil and Environmental Engineering 613)

The Greek Experience (Classics 211) Fall.

The Roman Experience (Classics 212) Spring

[The Individual and Society in Classical Athens (Classics 222) Not offered 1983-84 ]

[Greek and Roman Mystery Religions (Classics 237) Not offered 1983-84 ]

Computer Science 100, 101, and 211 may be of interest to some students (see the departmental listing for information about sequences and combinations).

Scientific Illustration (Floriculture 417)

Introductory Geological Science (Geological Sciences 101) Fall or spring.

Introduction to Historical Geology (Geological Sciences 102)

[Earth Science (Geological Sciences 103) Not offered 1983-84.]

[Earth Science Laboratory (Geological Sciences 105) Not offered 1983-84.]

Structural Geology and Sedimentation (Geological Sciences 325)

Sedimentology and Stratigraphy (Geological Sciences 376)

Glacial and Quaternary Geology (Geological Sciences 642)

Ancient Greece from Homer to Alexander (History 265) Fall.

The Greek City from Alexander to Augustus, 323 B.C.-A.D. 14 (History 373)

Indochina and the Archipelago to the Fourteenth Century (History 395) Fall.

[The Tragedy of Classical Athens (History 452) Not offered 1983-84.]

The Crisis of the Greek City-State (History 453)

Introductory Statistics for the Social Sciences (Industrial and Labor Relations 510)

Hittite (Linguistics 621-622)

Elementary Statistics (Mathematics 372)

Statistics (Mathematics 472-473)

Ancient Near Eastern Literature (Near Eastern Studies 332)

Elementary Akkadian (Near Eastern Studies 333-334)

Readings in Akkadian (Near Eastern Studies 335)

[Folklore in the Ancient Near East (Near Eastern Studies 336) Not offered 1983-84 ]

**Asian Studies**

B. de Bary, chairperson and director of undergraduate studies (388 Rockefeller Hall, 256-5095);  
B. R. Anderson, D. E. Ashford, R. Barker,  
M. L. Barnett, M. G. Bernal, J. A. Boon, K. Brazell,  
S. Cochran, J. Cole, R. D. Colle, L. Cornell,  
E. W. Coward, Jr., E. C. Erickson, B. Faure, J. W. Gair,  
M. D. Glock, F. H. Golay, A. B. Griswold, E. M. Gunn,  
M. Hatch, C. Hirschman, D. Holmberg, F. E. Huffman,  
R. B. Jones, E. H. Jorden, G. McT. Kahin,  
M. Katzenstein, G. B. Kelley, K. A. R. Kennedy,  
A. T. Kirsch, V. Koschmann, L. C. Lee, D. R. McCann,  
J. McCoy, R. D. MacDougall, K. March, T. L. Mei,  
G. M. Messing, J. Nickum, S. J. O'Connor,

T. J. Pempel, C. A. Peterson, P. S. Sangren, V. Shue, J. T. Siegel, R. J. Smith, J. U. Wolff, W. O. Wolters, 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 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.

## 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 300 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.

**Honors.** To be eligible for honors in Asian studies, a student must have a cumulative grade average of B+ in all Asian studies courses 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. 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.

## 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, including a history course and three courses or seminars at the intermediate or advanced level, two of which may be Southeast Asian language courses. 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 and to take advantage of summer intensive language training.

## 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.

## Freshman Seminars

**[101 Women and Social Transitions in the Twentieth Century]** Spring. 3 credits. Not offered 1983–84.

B. deBary.]

**[103 Revolutions and Social Values in Modern Chinese Literature]** Spring. 3 credits. Not offered 1983–84.

E. M. Gunn.]

**104 Three Ways of Thought** Fall. 3 credits.

M W 2:30–3:25 T. L. Mei and staff.

An introduction to Confucianism, Taoism, and Zen through reading and discussion of basic texts.

**105 Feminine and Masculine Ideals in Japanese Culture (also Women's Studies 105)** Spring. 3 credits.

M W F 12:20. K. Brazell.

**[110 People and Nature in East Asia]** Fall. 3 credits. Not offered 1983–84.]

**106 Poetics for Physicists** Fall. 3 credits.

B. deBary.

Pending approval of the Educational Policy Committee.

## Related Freshman Seminars in Other Departments

**[History 192 Japan and the West]** 3 credits. Not offered 1983–84.

V. Koschmann.]

**[History of Art 106 Art in a Landscape: The Traditional Arts of Southeast Asia]** 3 credits. Not offered 1983–84.

S. J. O'Connor.]

## General Education Courses

**211 Introduction to Japan** Fall. 3 credits

M W 11:15; disc, F 9:05, 11:15, or 1:25. K. Brazell and staff.

An interdisciplinary introduction to Japanese culture especially designed for students not majoring in Asian studies. The first part of the course focuses on traditional aspects of Japanese culture, which are still important today, while the second part analyzes contemporary society from a variety of perspectives. Guest lecturers from five or six departments speak on their areas of expertise.

**212 Introduction to China** Spring. 3 credits.

T R 1:25; disc to be arranged. E. M. Gunn and staff.

An interdisciplinary introduction to Chinese culture especially designed for students not majoring in Asian studies.

## Asia—Literature and Religion Courses

The following courses are taught entirely in English and are open to any Cornell student.

**250 Dimensions of Religious Experience in Asia** Spring. 3 credits.

T R 10:10–11:25. B. Faure.

A systematic approach to major themes of various Asian religious traditions within the context of human experience: sacred time and space; ritual behavior; pilgrimage; saints, sages, and other ideal types; views of death; relationships to the divine; meditation; art and Asian religions; etc.

**307 Asian Dance and Dance Drama (also Theatre Arts 307)** Fall or spring. 3 credits. May be repeated for credit. [Section 1: *Indian Dance*. Not offered 1983–84. Section 2: *Japanese Noh Theater*. Not offered 1983–84.] Section 3: *Javanese Dance*.

M W F 1:25. Urip Sri Maeny and staff.

Readings, lectures, and practice sessions in Indonesian dance. On Fridays there will be lectures, demonstrations and discussions on the histories and choreographies of several traditions of dance and dance drama in Indonesia. Videotapes and films will be shown. The Monday and Wednesday classes will consist of lessons in dance and will focus on performance of Javanese styles from repertoires of solo and group dances and dance dramas. These sessions will begin with the basic vocabulary of movement and proceed to the specific dances. No previous experience in dance is necessary.

**310 Readings in Korean Literature** Fall. 3 credits

Hours to be arranged. D. R. McCann.

A survey of works of literature most notably exemplifying the Korean cultural identity. Premodern works will include *The Song of Ch'oyong*, *The Story of Ch'unhyang*, and selected *kasa* and *sijo* poems. Modern works will also include both poetry and fiction. A principal theme to be considered will be the nature of the Korean past and present and the individual writer's relationship to them.

**[313 The Japanese Film]** Fall. Not offered 1983–84.]

**351 Early Buddhism** Fall. 4 credits.

T R 2:30–3:45. B. Faure.

Principles, practices, and goals of Indian Buddhism from Sakyamuni to the rise and establishment of early Mahayana movements. The first part of the course will focus on the life and teachings of Sakyamuni and the practices of early monastic Buddhism as seen from scriptural and archaeological sources. The second part of the course will concentrate on the spread of Buddhism throughout India, with attention to the role of Central Asian borderlands in the introduction of new concepts and the rise of new religious movements. The influence of Buddhism on Indian culture—including art and architecture, literature, medicine, and statecraft—will also be studied. Two guided papers and a final exam.

**352 Mahayana Buddhism** Spring. 4 credits. No prerequisites; Asian Studies 250 or Asian Studies 351 strongly recommended.

T R 2:30–3:45. B. Faure.

Principles, practices, and goals of later Buddhism in the northern Buddhist countries of China, Japan, and Tibet. Special focus on the transmission of Buddhism to these countries, its confrontation with native religious traditions, and the resulting adaptations and transformations. Important scriptures, tenets of major schools, lives of eminent teachers. Influence of Buddhism on Far Eastern culture (art, music, literature, etc.). Two guided papers and a final exam.

**[355 Japanese Religions]** Fall. 4 credits. Not offered 1983–84.]

**357 Chinese Religions** Spring. 4 credits.

T R 10:10–11:45. Staff.

A systematic survey of Chinese religious concepts and practices from the neolithic period to the twentieth century. Using historical and phenomenological approaches, the principle traditions of Confucianism, Taoism, and Buddhism, as well as folk religious practices, will be explored. Classical texts and scriptures in translation, lives of exemplary masters, interrelationships of religion and culture (including art and music, city planning, medicine, statecraft, etc.).

**[371 Chinese Philosophical Literature]** 4 credits Not offered 1983–84.]

**[372 Chinese Poetry]** Spring. 4 credits. Not offered 1983–84.

T. L. Mei.]

**373 Twentieth-Century Chinese Literature** Fall 4 credits.

T R 1:25, disc to be arranged. E. M. Gunn.  
A survey of the principle works in English translation, the course introduces fiction, drama, essay, 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. One session each week will be devoted to discussion.

**374 Chinese Narrative Literature** Spring 4 credits.

Hours to be arranged. E. M. Gunn.  
Selected works in classical Chinese fiction are read in translation. Major novels such as the *Dream of the Red Chamber* and *Water Margin* are emphasized.

**[375 Japanese Poetry and Drama** Spring 4 credits. Alternates with Asian Studies 377. Not offered 1983–84.]**376 Modern Japanese Fiction** Fall 4 credits. M F 12:20–1:45 plus one hour to be arranged. B. deBary.

The major Japanese novelists and short story writers of the twentieth century are studied in translation.

**[377 Japanese Narrative Literature** Spring 4 credits. Alternates with Asian Studies 375. Not offered 1983–84. M W 2:30–3:45. K. Brazell.]**[379 Southeast Asian Literature in Translation** Not offered 1983–84.]**[386 Folk Literature of East Asia** Spring 4 credits. Not offered 1983–84. D. McCann, J. McCoy.]**400 The Japanese Noh Theatre and Modern Dramatists (also Comparative Literature 400)** Fall 4 credits.

M W 2:30–4. K. Brazell.  
Several weeks will be spent studying the literary, performance, and aesthetic aspects of the noh theatre. Emphasis will be on noh as a performance system, a total theatre in which music, dance, text, costume, and props all interact to create the total effect. Then attention will turn to modern theatre people who have reacted to noh in some creative way. Choice of dramatists will depend partly on student interests but will probably include Yeats, Brecht, Britten, Claudel, Grotowski, and Mishima. All readings may be done in English translation.

*Note:* For complete descriptions of courses numbered 600 and above, consult the graduate faculty representative.

**601 Southeast Asia Seminar: Malaysia** Fall 4 credits.

R 3:30–5:30. C. Hirschman.  
Contact the Southeast Asia Program, 120 Uris Hall, 256-2378 for further information.

**602 Southeast Asia Seminar: Indonesia** Spring 4 credits.

Hours to be arranged. B. R. Anderson.  
Contact the Southeast Asia Program, 120 Uris Hall, 256-2378 for further information.

**604 Southeast Asia Seminar (also International Agriculture 601, Philippine Agricultural Development)****611 Chinese and Japanese Bibliography and Methodology** Fall 1 credit. Prerequisite: permission of instructor. Required of honors students and master of arts candidates.

Sec 1 (Chinese): W 9:05–9:55, sec 2 (Japanese): F 1:25–2:15. J. Cole.

**650 Seminar on Asian Religions** Spring 2–4 credits. Prerequisite: permission of instructor.

Hours to be arranged. B. Faure.  
Topic is announced annually.

**676 Southeast Asia Research Training Seminar** Contact the Southeast Asia Program, 120 Uris Hall, 256-2378, for more information**701–702 Seminar in East Asian Literature** 701, fall; 702, spring. 1–4 credits.

Hours to be arranged. Staff.

*Note:* For complete descriptions of courses numbered 600 or above, consult the graduate faculty representative.

**Asia—General Courses****401 Asian Studies Honors Course** Fall 4 credits. Intended for seniors who have been admitted to the honors program.

Staff.  
Supervised reading and research on the problem selected for honors work.

**402 Asian Studies Honors: Senior Essay** Fall or spring. 4 credits. Prerequisite: admission to the honors program.

The student, under faculty direction, prepares an honors essay.

**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.

**605–606 Master of Arts Seminar in East Asian Studies** 605, fall; 606, spring. 2–4 credits.

Hours to be arranged. Staff.

**703–704 Directed Research** 703, fall or spring; 704, fall or spring. Credit to be arranged.

Staff.

**Related Courses in Other Divisions****Urban Anthropology (Anthropology 313)****[Meaning across Cultures (Anthropology 320)** Not offered 1983–84.]**Images of Exotics (Anthropology 325)****Anthropological Approaches to the Study of Buddhism in Asia (Anthropology 619)****[Government and Politics of Southeast Asia (Government 344)** Not offered 1983–84.]**Politics in Contemporary Japan (Government 346)****[Politics of Industrial Societies (Government 348)** Not offered 1983–84.]**Political Role of the Military (Government 349)****Comparative Revolutions (Government 350)****The United States and Asia (Government 387)****Field Seminar in International Relations (Government 606)****Graduate Seminar in Political Economy of Change: Rural Development in the World (Government 648)****Seminar in International Relations of Asia (Government 687)****Introduction to Asian Civilizations: Origins to 1600 (History 190)****Introduction to Asian Civilizations in the Modern Period (History 191)****Introduction to Art History: Asian Traditions (History of Art 280)****[Buddhist Art in Asia (History of Art 381)** Not offered 1983–84.]**[Studies in Indian and Southeast Asian Art (History of Art 386)** Not offered 1983–84.]**Ceramic Art of Asia (History of Art 482)****[Problems in Asian Art (History of Art 580)** Not offered 1983–84.]

The courses listed below will count as College of Arts and Sciences credit only for Asian studies majors.

**Economics of Agricultural Development (Agricultural Economics 464)****Food, Population, and Employment (Agricultural Economics 660)****Architecture in Its Cultural Context (Architecture 667–668)****Communication in the Developing Nations (Communication Arts 624)****Seminar on Agricultural Development in Southeast Asia (International Agriculture 601)****[Applications of Sociology to Development Programs (Rural Sociology 751)** Not offered 1983–84.]**China—Area Courses****390 The Economies of China** Spring 4 credits. M W 2:30–3:45. J. Nickum.

Focusing on the economy of the People's Republic of China but with reference to the experiences of Taiwan, Hong Kong, and Singapore, this course investigates current economic problems and prospects in light of the major issues of China's economic history and previous and current economic institutions and policies. Seminar format.

**411 A Documentary Study of Contemporary China** Spring 4 credits.

Hours to be arranged. J. Nickum.  
An intensive analysis of the development of doctrine, institutions, and policies in the People's Republic of China through study of many of the principal documents. The basic course will use English language translations, with an additional section for credit for those who wish to read the original Chinese.

**Economic Anthropology (Anthropology 326)****Religion, Family, and Community in China (Anthropology 343)****[Modern Chinese Society (Anthropology 344)** Not offered 1983–84.]**Chinese Government and Politics (Government 347)****Comparative Revolutions (Government 350)****The Foreign Policy of China (Government 390)****[Readings on the Great Cultural Revolution (Government 447)** Not offered 1983–84.]**[Chinese Political Readings (Government 448)** Not offered 1983–84.]**[Capitalism and Communism: Chinese and Japanese Patterns of Development (Government 462)** Not offered 1983–84.]

**Politics of China (Government 645)**

[Readings from Mao Ze Dong (Government 651)  
Not offered 1983–84.]

**China and the West before Imperialism (History 193)**

[Early Warfare, East and West (History 360) Not offered 1983–84.]

[Art and Society in Modern China (History 390)  
Not offered 1983–84.]

**History of China up to Modern Times (History 393)**

**History of China in Modern Times (History 394)**

**Undergraduate Seminar in Medieval Chinese History (History 492)**

**Self and Society in Late Imperial and Twentieth-Century China (History 493)**

[Chinese Historiography and Source Materials (History 691) Not offered 1983–84.]

**Problems in Modern Chinese History (History 693–694)**

**Seminar in Medieval Chinese History (History 791)**

**Seminar in Modern Chinese History (History 793–794)**

**Introduction to the Arts of China (History of Art 380)**

[The Arts of Early China (History of Art 383) Not offered 1983–84.]

[Chinese Painting (History of Art 385) Not offered 1983–84.]

[The Arts in Modern China (History of Art 481)  
Not offered 1983–84.]

**Chinese Art of the T'ang Dynasty (History of Art 483)**

**Studies in Chinese Painting (History of Art 486)**

Other courses dealing extensively with China are Anthropology 205 and 322; Government 347, 348, 350, 387, 446, 606, and 645; History 190 and 191; History of Art 280, 381, 482, 580, and 596; Architecture 667–668; and Sociology 342.

## China—Language Courses

**Basic Course (Chinese 101–102)**

**Cantonese Basic Course (Chinese 111–112)**

**Intermediate Chinese I (Chinese 201–202)**

**Intermediate Cantonese (Chinese 211–212)**

**Intermediate Chinese (Chinese 301)**

**Intermediate Chinese III (Chinese 302)**

**Chinese Conversation—Intermediate (Chinese 303–304)**

**Intermediate Cantonese II (Chinese 311–312)**

**FALCON (full-time course, Chinese 161–162)**

**History of the Chinese Language (Chinese 401)**

[Linguistic Structure of Chinese: Phonology and Morphology (Chinese 403) Not offered 1983–84.]

[Linguistic Structure of Chinese: Syntax (Chinese 404) Not offered 1983–84.]

**Chinese Dialects (Chinese 405)**

**Chinese Dialect Seminar (Chinese 607)**

## China—Literature Courses

**Introduction to Classical Chinese (Chinese 213–214)**

**Chinese Philosophical Texts (Chinese 313)**

**Classical Narrative Texts (Chinese 314)**

**Readings in Modern Chinese Literature (Chinese 411–412)**

**T'ang and Sung Poetry (Chinese 420)**

**Directed Study (Chinese 421–422)**

[Readings in Literary Criticism (Chinese 424) Not offered 1983–84.]

**Readings in Folk Literature (Chinese 430)**

[Seminar in Chinese Poetry and Poetics (Chinese 603) Not offered 1983–84.]

**Seminar in Folk Literature (Chinese 609)**

**Advanced Directed Reading (Chinese 621–622)**

## Japan—Area Courses

**257 Contemporary Japanese Society (also Sociology 257) 3–4 credits.**

T R 8:40–9:55. L. Cornell.

Japan is often advanced as a model of a modern industrial society, a model the U.S. would do well to imitate. This course will examine whether this is a reasonable comparison by analyzing the life of the urban white-collar Japanese manager. Topics to be discussed include the structure of the firm, family life, the roles of women and men, equal opportunity and the educational system, problems of retirement and the aging of the population, the treatment of deviance, and the ethical and moral values that underlie the system. Students will learn how to analyze an industrial democracy whose roots are not in the Western European tradition.

**391 The Japanese Economy Fall. 4 credits.**

T R 2:30–3:45. J. Nickum.

The history, institutions, current status, and future prospects of the world's third largest economy. Topics covered include the economic geography of Japan; premodern (shogunate) economic development; modernization, expansion, war, and occupation economies; the dual economy; government-business relations; industrial organization; and foreign trade. Seminar format. No prerequisites.

**Japanese Society (Anthropology 345)**

**Japanese Ethnology (Anthropology 645)**

[Contemporary Japan (Government 100) Not offered 1983–84.]

**Business and Labor in Politics (Government 334)**

**Politics in Contemporary Japan (Government 346)**

[Politics of Productivity: Germany and Japan (Government 430) Not offered 1982–83.]

[Capitalism and Communism: Chinese and Japanese Patterns of Development (Government 462) Not offered 1983–84.]

[History of Japan to 1750 (History 397) Not offered 1983–84.]

[History of Modern Japan (History 398) Not offered 1983–84.]

[Seminar in Tokugawa Thought and Culture (History 489) Not offered 1983–84.]

**The Arts of Japan (History of Art 384)**

**Women and Society (Sociology 342)**

**Family and Kinship in History (Sociology 442)**

Other courses dealing extensively with Japan are Anthropology 313; Government 334, 348, 387, 446, 605, and 606; History 190, 191, and 192; History of Art 280, 381, 482, 580, and 596; and Architecture 667–668.

## Japan—Language Courses

**Basic Course (Japanese 101–102)**

**Accelerated Introductory Japanese (Japanese 123)**

**Japanese for Business Purposes (Japanese 141–142)**

**FALCON (full-time intensive course, Japanese 161–162)**

**Intermediate Japanese I (Japanese 201–202)**

**Japanese Conversation (Japanese 203–204)**

**Intermediate Japanese I and Conversation (Japanese 205–206)**

**Intermediate Japanese for Business Purposes (Japanese 241–242)**

**Intermediate Japanese II (Japanese 301–302)**

**Japanese Communicative Competence (Japanese 303–304)**

**Advanced Japanese (Japanese 401–402)**

**Linguistic Structure of Japanese (Japanese 404)**

**Oral Narration and Public Speaking (Japanese 407–408)**

**Directed Readings (Japanese 421–422)**

**Introductory Japanese for Business Purposes (Japanese 541–542)**

**Intermediate Japanese for Business Purposes (Japanese 543–544)**

## Japan—Literature Courses

**Introduction to Modern Literary Japanese (Japanese 405)**

**Introduction to Classical Japanese (Japanese 406)**

**Directed Readings (Japanese 421–422)**

**Seminar in Modern Literature (Japanese 611)**

**Seminar in Classical Literature (Japanese 612)**

**Advanced Directed Readings (Japanese 621–622)**

## South Asia—Area Courses

[Culture and Society in South Asia (Anthropology 342) Not offered 1983–84.]

**Architecture in Its Cultural Context (Architecture 667–668)**



[Government and Politics of India (Government 300) Not offered 1983–84 ]

India: Social and Economic Change in a Democratic Polity (Government 351)

[Studies in Indian and Southeast Asian Art (History of Art 386) Not offered 1983–84 ]

Dravidian Structures (Linguistics 400)

Indo-Aryan Structures (Linguistics 442)

Elementary Pall (Linguistics 640)

Elementary Sanskrit (Linguistics 641–642)

Seminar (Linguistics 700)

Directed Research (Linguistics 701–702)

Other courses dealing extensively with South Asia are Anthropology 321, 425, and 628; Architecture 433; Asian Studies 250 and 351; Government 387, 605, 606, and 687; History 190 and 191; History of Art 280, 386, 482, 580 and 596; Agricultural Economics 464; Communication Arts 624 and 626; and Rural Sociology 751.

### South Asia—Language Courses

Basic Course (Hindi 101–102)

Hindi Reading (Hindi 201–202)

Composition and Conversation (Hindi 203–204)

Readings in Hindi Literature (Hindi 301–302)

[Advanced Composition and Conversation (Hindi 303–304) Not offered 1983–84.]

Advanced Hindi Readings (Hindi 305–306)

Basic Course in Sinhala (Sinhalese 101–102)

Sinhala Reading (Sinhalese 201–202)

Composition and Conversation (Sinhalese 203–204)

Basic Course (Tamil 101–102)

Basic Course (Telugu 101–102)

Telugu Reading (Telugu 201–202)

### Southeast Asia—Area Courses

Microeconomic Issues in Agricultural Development (Agricultural Economics 664)

Sociotechnical Aspects of Irrigation (Agricultural Economics 754, Agricultural Engineering 771, and Rural Sociology 754)

Ethnographic Description (Anthropology 306)

Applied Anthropology (Anthropology 314 and Rural Sociology 355)

[Meaning across Cultures (Anthropology 320) Not offered 1983–84 ]

Comparative Religious Systems (Anthropology 322)

Ethnology of Island Southeast Asia (Anthropology 334)

[Ethnology of Mainland Southeast Asia (Anthropology 335) Not offered 1983–84 ]

Myth, Ritual, and Symbol (Anthropology 424)

Ritual Structures and Cultural Pluralism (Anthropology 425)

Anthropological Approaches to the Study of Buddhism in Asia (Anthropology 619)

Political Anthropology: Indonesia (Anthropology 628 and Government 647)

Southeast Asia: Readings in Special Problems (Anthropology 634–635)

Southeast Asia Seminar: Malaysia (Asian Studies 601) Fall 4 credits.  
R 3:30–5:30. C. Hirschman.

Southeast Asia Seminar: Indonesia (Asian Studies 602) Spring. 4 credits.  
Hours to be arranged. B. R. Anderson.

Southeast Asia Research Training Seminar (Asian Studies 676)

Directed Research (Asian Studies 703–704) 703, fall and spring; 704, fall and spring. Credit to be arranged.

The International Business Environment: Southeast Asia (Business and Public Administration NEC 509)

Southeast Asia Undergraduate Seminar (Government 300)

[Government and Politics of Southeast Asia (Government 344) Not offered 1983–84 ]

The United States and Asia (Government 387)

Political Anthropology: Indonesia (Government 647 and Anthropology 628)

International Relations of Asia (Government 687)

Introduction to Asian Civilization: Modern Period (History 191)

Southeast Asian History of the Fourteenth Century: Indochina and the Archipelago to the Fourteenth Century (History 395)

[Southeast Asian History from the Fifteenth Century (History 396) Not offered 1983–84 ]

Historiography of Southeast Asia (History 695–696)

[Seminar in Southeast Asian History (History 795–796) Not offered 1983–84 ]

[Art in Landscape: The Traditional Arts of Southeast Asia (History of Art 106) Not offered 1983–84.]

Introduction to Art History: Asian Traditions (History of Art 280)

[Buddhist Art in Asia (History of Art 381) Not offered 1983–84 ]

[Studies in Indian and Southeast Asian Art (History of Art 386) Not offered 1983–84 ]

[Traditional Arts in Thailand (History of Art 388) Not offered 1983–84 ]

[Ceramic Art of Asia (History of Art 482)

Problems Methodology Seminar (History of Art 595)

Comparative Methodology (Linguistics 404)

Sociolinguistics (Linguistics 405–406)

Field Methods (Linguistics 600)

Old Javanese (Linguistics 651–652)

Seminar in Southeast Asian Languages (Linguistics 653–654)

Malayo-Polynesian Linguistics (Linguistics 655–656)

Seminar in Austro-Asiatic Linguistics (Linguistics 657–658)

A Survey of Tone and Tonal Phenomena (Linguistics 700)

Directed Research (Linguistics 701–702)

Thai Dialectology (Linguistics 751)

Comparative Thai (Linguistics 752)

Tibeto-Burman Linguistics (Linguistics 753)

Introduction to World Musics (Music 103)

History, Theory, and Practice of Gamelan (Music 245–246)

Cornell Gamelan Ensemble (Music 445–446)

Introduction to Ethnomusicology (Music 680)

Rural Sociology and World Development Problems (Rural Sociology 105)

Rural Development and Cultural Change (Rural Sociology 355)

Subsistence Agriculture in Transition (Rural Sociology 357)

Sociotechnical Aspects of Irrigation (Rural Sociology 754, Agricultural Economics 754, and Agricultural Engineering 771)

Race and Ethnicity (Sociology 364)

Social and Demographic Change in Southeast Asia (Sociology 400)

Other courses dealing with Southeast Asia are Agricultural Economics 660 and 701; Agricultural Engineering 771 and 774; Agronomy 401; Architecture 667–668; Asian Studies 250, 351, 352, and 650; Business and Public Administration NCE 514; Communication Arts 624; Education 782 and 783; Government 692; History 190; International Agriculture 601, 602, 603, and 703; Nutritional Sciences 680 and 695; and Rural Sociology 430.

### Southeast Asia—Language Courses

Basic Course (Burmese 101–102)

Burmese Reading (Burmese 201–202)

Composition and Conversation (Burmese 203–204)

Advanced Burmese Reading (Burmese 301–302)

Basic Course (Cambodian 101–102)

Cambodian Reading (Cambodian 201–202)

Composition and Conversation (Cambodian 203–204)

Advanced Cambodian (Cambodian 301–302)

Directed Individual Study (Cambodian 401–402)

Structure of Cambodian (Cambodian 404)

**Basic Course (Cebuano [Bisayan] 101–102)**

**Elementary Course (Indonesian 101–102)**

**FALCON (full-time intensive course, Indonesian 161–162)**

**Indonesian Reading (Indonesian 201–202)**

**Composition and Conversation (Indonesian 203–204)**

**Linguistic Structure of Indonesian (Indonesian 300)**

**Readings in Indonesian and Malay (Indonesian 301–302)**

**Advanced Indonesian Conversation and Composition (Indonesian 303–304)**

**Directed Individual Study (Indonesian 305–306)**

**Advanced Readings in Indonesian and Malay Literature (Indonesian 401–402)**

**Elementary Javanese (Javanese 131–132)**

**Intermediate Javanese (Javanese 133–134)**

**Directed Individual Study (Javanese 203–204)**

**Basic Course (Tagalog 101–102)**

**Tagalog Reading (Tagalog 201–202)**

**Linguistic Structure of Tagalog (Tagalog 300)**

**Basic Course (Thai 101–102)**

**Thai Reading (Thai 201–202)**

**Composition and Conversation (Thai 203–204)**

**Advanced Thai (Thai 301–302)**

**Thai Literature (Thai 303–304)**

**Directed Individual Study (Thai 401–402)**

**Basic Course (Vietnamese 101–102)**

**Vietnamese Reading (Vietnamese 201–202)**

**Composition and Conversation (Vietnamese 203–204)**

**Advanced Vietnamese (Vietnamese 301–302)**

**Directed Individual Study (Vietnamese 401–402)**

to 332. The last of these, Astronomy 332, requires calculus and a year of college physics, and Astronomy 111–112 require at least coregistration in beginning calculus. The other courses 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.

There is no undergraduate major in astronomy at Cornell because the department believes that a major in physics and mathematics is the best preparation for the study of astronomy at the graduate level. Students who are interested in becoming astronomers should major in physics as undergraduates. It is wise to get an early start in mathematics and physics, preferably by registering for Mathematics 191–192 or 193–194 or 111–112 in the freshman year and by taking Physics 112 as soon as the prerequisites have been completed.

## Concentration

Students interested in astronomy are encouraged to supplement their major with a concentration in astronomy, which is somewhat less intensive than a major. 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.

## Distribution Requirement

The distribution requirement in physical sciences is met by either of the following two sequences: Astronomy 101 and 102 or Astronomy 111 and 112.

## Courses

**101 The Universe beyond the Solar System** Fall. 4 credits.

Lecs, M W F 11:15; lab, M T W or R 7:30–10 p.m., or T W 2:30–5. One lab every other week. Y. Terzian. Labs, P. Gierasch.

An examination of the universe and our place in it, and the possible existence of life and intelligence elsewhere in the cosmos. The physical 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, composition, and influence of the interstellar material on the evolution of our galaxy. An introduction to the special and general theories of relativity. Modern theories of the structure and evolution of the universe.

**102 Our Solar System** Spring. 4 credits.

Prerequisites: high school algebra and Astronomy 101 or permission of instructor.

Lec, M W F 11:15; lab, M T W or R 7:30–10 p.m., or T W 2:30–5 p.m. One lab every other week. Exams may be given in the evening. J. Veverka. Labs, P. Gierasch.

Formation of the solar system. Surfaces, environments, and internal structures of planets and satellites. Evolution of the earth's crust, oceans, and atmosphere. Origin of life. Search for life in the solar system and elsewhere.

**103 The Universe beyond the Solar System** 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.

**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.

**105 An Introduction to the Universe** Summer. 3 credits.

M–F 11–12:15; evening laboratories 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.

**106 Essential Ideas in Relativity and Cosmology** Summer. 3 credits. Prerequisites: high school algebra and trigonometry.

M–F 9:30–10:45. 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.

**111 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 10:10; rec, one hour each week to be arranged; plus some evening observing periods. I. Wasserman.

The formation and evolution of stars. Supernovae, pulsars, quasars, and black holes. The interstellar medium. The structure and evolution of galaxies. Cosmology.

**112 The Solar System, Planets, and Life** Fall.

4 credits. Intended for engineering and physical sciences freshmen. Prerequisite: introductory calculus or coregistration in Mathematics 111 or 191.

Lecs, M W F 10:10; rec, one hour each week to be arranged; some evening labs to be arranged. S. Ostro.

The origin of the solar system. Celestial mechanics. The physics and chemistry of planetary surfaces, atmospheres, and interiors. Spacecraft results. Prebiology and the origin of life. The search for life elsewhere in the universe.

**201 Our Home in the Universe** Fall. 2 credits

T R 2:30–3:45. T. Gold.

A general discussion of man's relation to the physical universe; the nature of space and time as understood in modern physics; the universe of galaxies and stars, and the particular system of planets and satellites encircling one such average star, our sun. The origin and evolution of the solar system as revealed by modern planetary exploration. The great uncertainties that remain.

**215 Information and Knowledge in Science and Engineering** Fall. 4 credits.

T R 10:10–11:35. M. Harwit.

Topics to be covered include the exact and probabilistic laws of nature; messages, information content, and entropy; the Heisenberg uncertainty principle as a fundamental limitation on what we can know about the behavior of physical systems; coding of messages, cryptography, unbreakable codes, error correcting codes; self-replicating machines; transmission of genetic information in biology; mutations and biological evolution; transmission, storage, and processing of information in machines and animals; robots and artificial intelligence;

## Astronomy

Y. Terzian, chairman and director of undergraduate studies (428 Space Sciences Building, 256-4935); S. V. W. Beckwith, D. Campbell, J. M. Cordes, F. D. Drake, P. J. Gierasch, T. Gold, T. Hagfors, M. O. Harwit, M. P. Haynes, J. R. Houck, P. D. Nicholson, S. T. Ostro, C. E. Sagan, E. E. Salpeter, S. L. Shapiro, S. A. Teukolsky, J. F. Veverka, I. M. Wasserman

Professors and graduate students in astronomy at Cornell are very active in the national space exploration program as well as in studies of infrared astronomy and theoretical astrophysics. Cornell operates two local optical observatories and the world's largest radio telescope at Arecibo, Puerto Rico.

The department offers a number of courses that are of general interest, have few or no prerequisites, and are not intended for the training of professional astronomers. These courses are numbered from 101

transmission of information across the universe—astronomical data and communication with intelligent civilizations. At the Level of *Scientific American*.

**321 Life in the Universe** Spring. 4 credits  
Prerequisites: upperclass standing with a major in a physical or biological science, or permission of instructor.

T R 2:30–3:45. F. Drake.  
The theories of life in the universe; aspects of stellar evolution relevant to biology; nucleosynthesis; theories of planetary formation; evolution of planetary surfaces and atmospheres; chemical evolution on earth-like planets; evolution of intelligent and technological life. Cosmic limitations on technology. Methods to detect extraterrestrial life, particularly through radio observations; optimization of search methods; hypothetical communication systems.

**332 Elements of Astrophysics** Spring. 4 credits  
Prerequisites: calculus, Physics 213. Physics 214 strongly recommended.

Lecs. M W F 11:15. P. Nicholson.  
An introduction to astronomy, with emphasis on the application of physics to the study of the universe. Physical laws of radiation. Theories of the solar system. Distance, size, mass, and age of stars, galaxies, and the universe; stellar evolution and nucleosynthesis; interstellar matter and star formation. Supernovae, pulsars, and black holes. Galaxies and quasars. Introduction to cosmology. Intended for students interested in astronomy, physics, and engineering.

**431 Introduction to Astrophysics and Space Sciences I** Fall. 4 credits.

M W F 10:10. S. Beckwith.  
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.

**432 Introduction to Astrophysics and Space Sciences II** Spring. 4 credits. Prerequisite: Astronomy 431 or permission of instructor.

M W F 10:10. S. Beckwith, J. Cordes.  
Formation of the chemical elements. Origin of the solar system; stellar evolution; white dwarfs, neutron stars and black holes; stellar systems, clusters, galaxies, and quasars. Cosmology. At the level of *Astrophysical Concepts*, by Harwit.

**433 The Sun** Spring. 4 credits.

T R 1:25. P. Gierasch, T. Gold.  
The sun as a star, stellar evolution, neutrinos from the sun, solar seismology. The solar surface and magnetic field, the dynamo, solar flares and eruptions, plasma phenomena, energetics of the corona. Solar terrestrial influences, the solar spectrum, the solar wind, interplanetary phenomena. At the level of *The New Solar Physics*, by Eddy.

**434 The Evolution of Planets** Fall. 4 credits.

M W F 11:15. J. Veverka.  
An introduction to the physical and chemical processes that have been active in altering the environments of planets and satellites from their original to their present state. Theories of the formation of the solar system are revealed, with special emphasis on chemical differentiation of the primeval solar nebula. A critical assessment is made of how well the various theories account for the clues left in the meteorite record and how well they explain the current environments of the planets and satellites. The main ideas about the formation and evolution of terrestrial planets, satellite systems, and asteroids are considered in detail. Some specific topics included are the history of the earth-moon system, the probable evolution of Jupiter's Galilean satellites, and the comparative histories of Venus, Earth, and Mars.

**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.  
Individual work on selected topics. A program of study is devised by the student and instructor.

**[490 Senior Seminar** Fall. Not offered 1983–84.]

**[509 General Relativity (also Physics 553)]** Fall. Not offered 1983–84.]

**[510 Applications of General Relativity (also Physics 554)]** Spring. Not offered 1983–84.]

**511 High-Energy Astrophysics** Spring. 4 credits.

T R, hours to be arranged. S. Teukolsky.  
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. No astronomy or general relativity prerequisites. Text: *Physics of Black Holes, White Dwarfs, and Neutron Stars*, by Shapiro and Teukolsky.

**[516 Galactic Structure and Stellar Dynamics]** Spring. Not offered 1983–84.]

**520 Radio and Radar Astronomy** Fall. 4 credits.

T R 2:30–3:45. F. Drake, S. Ostro.  
Radio astronomy telescopes and electronics; antenna theory; observing procedures and data analysis; concepts of interferometry and aperture synthesis. Radar astronomy techniques. Theories of radio emission; applications to the theory of radio sources. Radio and radar astronomy of the solar system. The search for extraterrestrial intelligence.

**521 Radio Astrophysics** Spring. 4 credits.

Hours to be arranged. J. Cordes.  
Thermal and nonthermal radiation processes. Emission from the interstellar medium, giant molecular clouds, planetary nebulae, novae, supernovae, pulsars, radio galaxies, quasars. Cosmic blackbody radiation. Galactic structure and kinematics from 21-cm line emission. Models from pulsar magnetospheres, double radio galaxies, and quasi-stellar objects. Observational cosmology.

**[523 Signal Processing in Astronomy]** Spring. Not offered 1983–84.]

**[555 Theory of the Interstellar Medium (also Physics 665)]** Fall. Not offered 1983–84.]

**560 Theory of Stellar Structure and Evolution (also Physics 667)** Fall. 4 credits.

M W F 1:25. I. Wasserman.  
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 Evolution and Nucleosynthesis*, by Clayton.

**570 Physics of the Planets** Fall. 4 credits.

Hours to be arranged. P. Nicholson.  
An introductory survey of planetary science, with an emphasis on the application of physical principles. Recent observational results, including those of ground-based optical, infrared, radio, and radar astronomy as well as those made by spacecraft, will also be discussed. Planetary dynamics, including satellite orbits, tidal interactions, and ring dynamics. An introduction to the theory of planetary interiors, gravitational and magnetic fields, heat sources, and chemical composition. Physics and chemistry of planetary atmospheres, radiative transfer, convection,

thermal structure, and dynamics. Planetary magnetospheres. Intended for students in astronomy, physics, and engineering.

**[571 Mechanics of the Solar System (also Theoretical and Applied Mechanics 673)]** Spring. Not offered 1983–84.]

**[575 Planetary Atmospheres]** Fall. Not offered 1983–84.]

**[579 Celestial Mechanics (also Theoretical and Applied Mechanics 672)]** Fall. Not offered 1983–84.]

**[620 Seminar: Advanced Radio Astronomy]** Fall. Not offered 1983–84.]

**633 Seminar: Advances in Infrared Astronomy** Spring. 1 credit.

Hours to be arranged. J. Houck.  
Most of the course will be devoted to results and interpretation of recent observations, including the findings of the Infrared Astronomical Satellite. Modern techniques and their limitations will be briefly discussed.

**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.

**[660 Cosmic Electrodynamics (also Applied and Engineering Physics 608)]** Not offered 1983–84.]

**671 Special Topics in Planetary Astronomy: The Saturn System** Spring. 3 credits

W 11:30–1:30. C. Sagan.  
In past years the course has focused on such topics as the interiors of planets, the surface and atmosphere of Mars, Voyager exploration of the outer solar system, cosmic organic chemistry and exobiology, and instrumental techniques.

**[673 Seminar: Current Problems in Planetary Fluid Dynamics]** Spring. Not offered 1983–84.]

**[680 Seminar: Cosmic Rays and High-Energy Electromagnetic Radiation (also Physics 680)]** Spring. Not offered 1983–84.]

**699 Seminar: Computational Astrophysics** Fall

3 credits. T R 10:10–11:30. S. Shapiro, S. Teukolsky.  
Prerequisites: working knowledge of Fortran. Only those students who have completed the fundamental graduate physics courses should consider attending. A course designed to familiarize graduate students with numerical techniques for solving diverse problems in astrophysics. Topics in hydrodynamics will be included as examples of nonlinear phenomena. Numerical methods discussed in the course will include solving ordinary and partial differential equations, linear algebra and eigenvalue problems, Monte Carlo techniques, fast Fourier transforms, etc. Students will be allotted computer time to solve, both individually and in small teams, assigned numerical exercises.

**699 Seminar: Problems in the Interstellar Medium** Spring. 2 credits.

Hours to be arranged. E. Salpeter.  
Will cover some topics of current interest, chosen from (1) radiative transfer theory for spectral lines, (2) energy balance of the interstellar gas, (3) formation of molecules, and (4) physics of dust grains.

## Biological Sciences

Director, to be named; H. T. Stinson, associate director and director of undergraduate studies (118 Stimson Hall, 256-5233); S. D. Miller, assistant director for academic affairs/student services (Biology Center, G20 Stimson Hall, 256-3358)

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.

At Cornell the program of study in biology 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.

The biology program is designed to enable students to acquire necessary scientific foundations, to become familiar with different aspects of modern biology, and then to concentrate in a specific area of biology. Areas of concentration include animal physiology and anatomy; biochemistry; botany; cell biology; ecology, systematics, and evolution; genetics and development; or neurobiology and behavior. Special concentration programs are available for qualified students with particular interest in areas such as biophysics, microbiology, or nutrition. As an alternative to selecting one of the concentration areas, students may choose to complete the Program in General Biology. Students interested in the marine sciences may consult the Cornell Marine Programs Office (G14 Stimson Hall, 256-3717) for academic advice and career counseling. For more details see the Division of Biological Sciences section.

## Burmese, Cambodian, and Cebuano (Bisayan)

See Modern Languages, Literatures, and Linguistics, p. 152.

## Chemistry

R. Hoffmann, chairperson and director of undergraduate studies (124 Baker Laboratory, 256-4174); H. D. Abrufu, A. C. Albrecht, B. A. Baird, J. M. Burlitch, B. K. Carpenter, J. C. Clardy, D. B. Collum, W. D. Cooke, G. S. Ezra, R. C. Fay, M. E. Fisher, J. H. Freed, B. Ganem, M. J. Goldstein, E. R. Grant, G. G. Hammes, P. L. Houston, F. W. McLafferty, J. E. McMurry, J. Meinwald, G. H. Morrison, R. F. Porter, J. R. Rasmussen, H. A. Scheraga, M. J. Sienko, K. H. Theopold, D. A. Usher, B. Widom, J. R. Wiesenfeld, C. F. Wilcox, P. T. Wolczanski

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.

### The Major

The chemistry major at Cornell is not an easy option; it requires conceptual skills in mathematics and logical thinking, practical and laboratory skills, and creativity in the design of experiments. 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 provide the basis for significant work in related areas such as molecular biology, chemical physics, geochemistry, chemical engineering, and solid state physics. A major in chemistry permits considerable flexibility in the detailed planning of a course program. The

required courses 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 courses (including mathematics and physics) prerequisite to those that are more advanced. During the first year, the student should normally register for general chemistry (preferably but not necessarily Chemistry 215), mathematics, a Freshman Seminar course, a foreign language if necessary, or, in some instances, physics. Although Chemistry 215–216 is preferred, students may begin their programs with Chemistry 207–208. Chemistry 215–216 is limited to 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 the 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; 389–390, Physical Chemistry I and II; and 302–303, Experimental Chemistry II and III, which should be completed in the third year. Advanced work in chemistry and related subjects can be pursued in the fourth year and, to some extent, in the earlier years as well. The opportunity for independent research is also available. All students with questions about details of a major program are encouraged to consult the chairperson of the Department of Chemistry or the chairperson's representative. Entering students who are exceptionally well prepared in chemistry may receive advanced placement credit for Chemistry 207–208 and proceed to a more advanced program.

Prerequisites for admission to a major in chemistry are (1) Chemistry 215–216 or 207–208 plus 300, (2) Physics 207, 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 courses such as Computer Science 100. The minimum additional courses that must be completed for a major in chemistry are listed below.

- 1) Chemistry 301, 302, 303, 359–360 (or, if necessary, 357–358 may be substituted), and 389–390
- 2) Mathematics 112 plus 214, 215, 216, 217; or 122 plus 221, 222; or 192 plus 293, 294
- 3) Physics 208

Potential majors electing to take the mathematics sequence 214–217 are strongly urged to do so in their sophomore year to avoid scheduling conflicts with Chemistry 389 in their junior year.

This sequence is a core program in chemistry. It is anticipated that students will, through elective courses, extend it substantially in whatever direction suits their own needs and interests. It is particularly important that those going on to do graduate work in chemistry recognize that these requirements are minimal, and such students are strongly urged to supplement their programs, where possible, with Chemistry 404, 405, 410, 605, 606, 668, and 681, and German or Russian. 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.

### 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 in all chemistry laboratories. Students are reminded to take their goggles 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 \$5 fee in addition to charges for any breakage.

### Courses

Preliminary examinations for all courses may be given in the evening.

**103–104 Introduction to Chemistry** 103, fall; 104, spring. 3 credits each term. 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. Not recommended for students who plan to do further work in chemistry subsequent to Chemistry 104. Lects, M W 11:15 or 12:20; lab, T or R 8–11, or F 10:10–1:10, or M W or F 1:25–4:25. Prelims: 7:30–9:00 p.m., Oct. 6, Nov. 15, March 1, April 12. Fall: H. A. Scheraga; spring, D. A. Usher.

An introduction to chemistry, with emphasis on the important principles and facts of inorganic and organic chemistry.

**201 Chemistry of the Environment** Fall. 3 credits. Prerequisite: one year of high school or college chemistry.

Lec, M W F 12:20. J. R. Wiesenfeld. An introduction to the chemical description of environmental phenomena, with an emphasis on natural geochemical cycles. Effects of perturbations introduced by human activities.

**202 Origins of Life** Fall. 3 credits. Prerequisite: one year of chemistry or biochemistry. Extra sessions will be held periodically for students without this background. S-U grades; letter grades possible after consultation with instructor.

Lects, T R 12:20–1:30. D. A. Usher. Birth of solar system and conditions on the early earth; characteristics of molecules essential to life today; prebiotic syntheses of biological molecules and further chemical evolution; origin of protein synthesis and the genetic code; effect of cycles in temperature (day and night, summer and winter) and humidity (dew, rain, tides) on early chemical systems; the rock record; geological and molecular fossils; other possibilities for life; different genetic material and extraterrestrial life. A determined effort is made to distinguish fact from hypothesis and from fiction; there will be much critical reading of the research literature.

**203 In the Realm of Organic Chemistry** Fall. 3 credits

Lecs and discs, T R 12:20. M. J. Goldstein. The applications of organic chemistry surround us; they touch us more frequently than those of any other science. Organic chemistry is also unique among the sciences in its use of a pictographic language to record and transmit its ideas. Each of these two aspects illustrates a different human preoccupation: a concern for people and a search for order in patterns that transcend personal experience. This course will examine the historical development of contemporary organic chemistry as a unique marriage of these two preoccupations. Interactions with biochemistry, inorganic chemistry, mathematics, and physics will also be considered. Readings from the original scientific literature will be analyzed in class and then evaluated in papers to be submitted at regular intervals. No formal examinations will be offered, nor will any formal prerequisites be required. A talent for spatial perception, a previous exposure to French and German, and an inquiring mind will reward those who might chance to possess them.

**207–208 General Chemistry** 207, fall; 208, spring. 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 9:05, 10:10, or 12:20; spring, T R 9:05 or 10:10. Lab: fall, T W R or S 8–11; F 10:10–11:10; M T W R or F 1:25–4:25; spring, M T W R or F 12:20–4:25 or S 8–12. Prelims: 7:30–9 p.m., Oct. 4, Nov. 8, Feb. 28, April 10. Fall: M. E. Fisher, B. Widom; spring, R. C. Fay.

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 Chemistry 207–208 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.

**215–216 General Chemistry and Inorganic Qualitative Analysis** 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: lec, M W F 12:20; lab, M T W R or F 1:25–4:25. Spring: lec, M W F 12:20; two labs, M W 1:25–4:25, T R 10:10–1:10, T R 1:25–4:25, or F 1:25–4:25 and S 8–11. Prelims: 7:30–9 p.m., Sept. 27, Oct. 25, Nov. 22, Feb. 16, March 6, April 19. Fall, B. A. Baird; spring, P. T. Wolczanski.

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.

**251 Introduction to Experimental Organic Chemistry** Fall. 2 credits. Recommended for non-chemistry majors. Prerequisite or corequisite: Chemistry 253 or 357 or permission of instructor.

Lec, M or F 8 (all students attend first lecture); lab, M T W or R 1:25–4:25, or T or R 8–11. Prelims: 7:30–9 p.m., Oct. 11, Nov. 17. J. R. Rasmussen. Introduction to synthesis and the separation and handling of materials, including applications of many types of chromatography, simple and fractional distillation, crystallization, extraction, and others.

**252 Elementary Experimental Organic Chemistry** Spring. 2 credits. Recommended for non-chemistry majors. Prerequisite: Chemistry 251.

Lec, M 8; lab, M T W or R 1:25–4:25.

J. E. McMurry. A continuation of Chemistry 251.

**253 Elementary Organic Chemistry** Fall. 4 credits. Primarily for students in the premedical and biological curricula. Limited to 480 students. Prerequisite: Chemistry 104 with grade of C or better or Chemistry 208 or 216.

Lecs, M W F S 10:10; make-up lec may be given in the evening. Prelims: 7:30–9 p.m., Sept. 27, Oct. 27, Nov. 29. J. E. McMurry.

The occurrence and properties of organic molecules and the mechanisms of organic reactions, including a brief introduction to the organic chemistry of biological systems, are studied.

*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. Premedical students should determine the entrance requirements of the particular medical school they wish to enter. Students may earn 6 credits by taking Chemistry 251–253 or 8 credits by taking Chemistry 253–301 or 253, 251, and 252.

**255 Elementary Organic Chemistry** Fall. 2 credits.

Same course as Chemistry 253, but to be taken for reduced credit by students already having 3 credits for Chemistry 357.

**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.

Lecs, M W F 9:05; rec, M or W 1:25, T 9:05. Prelims: 7:30–9 p.m., Sept. 29, Oct. 27, Nov. 29, Feb. 16, Mar. 22, Apr. 26. Fall, G. S. Ezra; spring, B. A. Baird.

A systematic treatment of the fundamental principles of physical chemistry.

**289–290 Introductory Physical Chemistry Laboratory** 289, fall; 290, spring. 2 credits each term. Prerequisite for Chemistry 290: Chemistry 289. Corequisite: registration in Chemistry 287–288.

Lec, T 1:25 or R 9:05; lab, M T W R or F 1:25–4:25. Fall, R. F. Porter; spring, P. L. Houston. Quantitative and qualitative methods basic to the experimental study of physical chemistry.

**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 or a split session: W 12:20 plus F 1:25–4:25. Lab includes one-hour rec. G. H. Morrison.

Gravimetric, volumetric, spectrophotometric, and potentiometric methods are emphasized. Lectures and problem sets stress the relationship between theory and applications.

**301 Experimental Chemistry I** Spring. 4 credits. Prerequisite: Chemistry 216 or 300, and 253 or 357 or 359. Concurrent registration in Chemistry 253 is not recommended.

Lecs, M W 8; 2 labs, M W 1:25–4:25 or T R 8–11 or 1:25–4:25. J. R. Rasmussen.

An introduction to synthesis and the separation and handling of materials, including applications of many types of chromatography, simple and fractional distillation, crystallization, extraction, and others.

**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, T R 9:05–12:05, T R 1:25–4:25, or F 1:25–4:25 and S 9–12. Prelims: 7:30–9:00 p.m., Oct. 11, Nov. 29. C. F. Wilcox, H. D. Abruña.

Synthesis and quantitative analysis of both inorganic and organic compounds; instrumental methods, including optical spectroscopy, atomic absorption, NMR, mass spectroscopy, gas chromatography, GCMS, and electrochemical methods, are surveyed. Trace element analysis.

**303 Experimental Chemistry III** Spring. 4 credits. Each lab limited to 18 students. Prerequisites: Chemistry 302, 389, 390; coregistration in the latter is permissible; knowledge of computer programming is essential.

Lecs, M W F 9:05 (some weeks lec may be on F instead of W); 2 labs, M W 1:25–4:25 or T R 8–11 or 1:25–4:25. R. F. Porter.

An introduction to the techniques of vacuum line construction and operation; the principles and assembly of electronic measuring devices, optics, and kinetics.

**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. Prerequisite for Chemistry 358: Chemistry 357; recommended: concurrent registration in Chemistry 301.

Lecs, M W F 9:05; optional rec may be offered.

Fall, J. C. Clardy; spring, B. K. Carpenter. 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.

**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, or 208 with a grade of B 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; make-up lec, W 7:30 p.m. B. Ganem.

A rigorous and systematic study of organic and organometallic compounds, their structures, the mechanisms of their reactions, and the ways that they are synthesized in nature and in the laboratory.

**389–390 Physical Chemistry I and II** 389, fall; 390, spring. 4 credits each term. Prerequisites: Mathematics 214, 215, 216, 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 and make-up lec, W 7:30 p.m. Prelims: 7:30–9:00 p.m., Sept. 22, Oct. 13, Nov. 10, Dec. 8, Feb. 21, March 20, April 17. Fall, P. L. Houston; spring, A. C. Albrecht.

The principles of physical chemistry are studied from the standpoint of the laws of thermodynamics, kinetic theory, and quantum chemistry.

**[404 Advanced Measurements Laboratory** Fall. 4 credits. Prerequisite: Chemistry 303. Not offered 1983–84.

Lab, M T R 1:25–4:25, plus occasional evening lec. Alternative hours may be arranged if necessary.

Applications of modern experimental techniques in a variety of fields. Emphasis is on kinetics, spectroscopy, and electronics.]



**405 Techniques of Modern Synthetic Chemistry** Spring. 6 credits. Enrollment limited. Prerequisite: Chemistry 302 and permission of instructor. Selection of students will be based on grades in Chemistry 301 and 302. With permission of the instructor, graduate students may perform a minimum of three two-week experiments on a prearranged schedule.

Lab time required: 16 hours each week, including at least two 4-hour sessions in 2 sections (M W 1:25 or T R 1:25). First meeting will be at 4:30 on first class day of semester. Lec, first week only, at times to be arranged. J. M. Burlitch.

The syntheses of complex organic 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, photochemical and electrochemical methods, solid phase peptide synthesis, and macro and micro techniques. Elementary glassblowing.

**410 Inorganic Chemistry** Spring. 4 credits. Prerequisites: Chemistry 358 (or 360) and Chemistry 389.

Lec, M W F 11:15. K. H. Theopold.  
A systematic study of the synthesis, structure, and reactivity of inorganic and organometallic compounds.

**421 Introduction to Inorganic 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.

**433 Introduction to Analytical 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.

**461 Introduction to Organic Research** Fall or spring. 2–4 credits. Enrollment limited to those having a record of B– or better in prerequisite courses. Prerequisites: Chemistry 302 and 358 or 360 or permission of instructor.

Selected faculty.  
Research in organic chemistry involving both laboratory and library work, planned in consultation with a faculty member.

**477 Introduction to Research in Physical Chemistry** Fall or spring. 2–4 credits. Prerequisites: Chemistry 390 with an average of B– or better and permission of instructor.

Selected faculty.  
Research in physical chemistry involving both laboratory and library work, planned in consultation with a faculty member.

**498 Honors Seminar** Spring. No credit. Admission by departmental invitation. Additional prerequisite 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.

J. M. Burlitch, M. J. Goldstein.  
Informal presentations and discussions of selected topics in which all students participate. Individual research is on advanced problems in chemistry under the guidance of a faculty member, culminating in a written report.

**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 4:40. G. G. Hammes.  
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.

**605 Advanced Inorganic Chemistry I: Symmetry and Structure** Fall. 4 credits. Prerequisite: Chemistry 389–390 or equivalent or permission of instructor.

Lecs, M W F 11:15. R. C. Fay.  
This is the first of a three-term sequence. Symmetry and structure of discrete molecules, translational symmetry of arrays of molecules in crystals. Group theory at the level of Cotton's *Chemical Applications of Group Theory*, Schönland's *Molecular Symmetry*, and Hall's *Group Theory and Symmetry in Chemistry*. Applications include molecular orbital theory, hybridization, and molecular vibrations. Readings in the chemistry of nontransition elements at the level of Cotton and Wilkinson's *Advanced Inorganic Chemistry*.

**606 Advanced Inorganic Chemistry II: Synthesis and Reactivity of Inorganic and Organotransition Metal Compounds.** Fall. 4 credits. Prerequisite: Chemistry 605 or permission of instructor.

Lecs, M W F 10:10. P. T. Wolczanski.  
The second of a three-term sequence. Synthesis, structure, and reactivity of organometallic complexes. Emphasis on mechanistic considerations of fundamental processes. An overview of homogeneous catalysis and applications of organometallics in organic synthesis is included. Readings at the level of Collman and Hegedus's *Principles and Applications of Organotransition Metal Chemistry*.

**607 Advanced Inorganic Chemistry III: Structure and Properties** Spring. 4 credits. Prerequisite: Chemistry 605 or permission of instructor.

Lecs, M W F 9:05. M. J. Sienko.  
The third of a three-term sequence. Introduction to ligand field theory and solid-state structure and properties, at the level of Figgis' *Introduction to Ligand Fields*, Krebs' *Fundamentals of Inorganic Crystal Chemistry* and Sach's *Solid State Theory*. Readings in transition metal chemistry at the level of Cotton and Wilkinson's *Advanced Inorganic Chemistry*.

**622 Chemical Communication (also Biological Sciences 623)** Fall. 3 credits. Limited to 30 students. Prerequisites: Chemistry 358, Biological Sciences 102, and Biochemistry 231. Intended primarily for research-oriented students. Offered alternate years.

Lecs, M W F 1:25. 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.

**625 Advanced Analytical Chemistry I** Fall. 4 credits. Open to undergraduates with permission of instructor. Prerequisite: Chemistry 288 or 390 or equivalent.

Lecs, M W F 8; exams, T 7:30 p.m. W. D. Cooke.  
The application of molecular spectroscopy to chemical problems. Topics in ultraviolet, infrared, NMR, Raman, and mass spectroscopy are discussed.

**[627 Advanced Analytical Chemistry II]** Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 or equivalent. Not offered 1983–84.

Lecs, T R 10:10; problem sessions and exams, T 7:30 p.m.

Modern analytical methods, including electron, Mossbauer, and Fourier spectroscopy; mass spectrometry; methods applicable to macromolecules; information theory.]

**628 Advanced Analytical Chemistry III** Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 or equivalent. Offered alternate years.

Lecs, T R 10:10. G. H. Morrison.  
Modern trace, micro, and surface methods of analysis, including atomic spectrometry, solid mass spectrometry, activation analysis, microscopes, microprobes, and electron spectroscopy.

**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 8:15 p.m. D. B. Collum.  
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.

**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; make-up lectures and exams, W 7:30 p.m. B. K. Carpenter.  
A survey of reaction mechanisms and reactive intermediates in organic chemistry. Applications of qualitative molecular orbital theory are emphasized.

**666 Synthetic Organic Chemistry** Spring. 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisites: Chemistry 665 or permission of instructor.

Lecs, M W F 10:10; additional lec to be arranged. D. B. 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 synthetic planning.

**[668 Chemical Aspects of Biological Processes]** Fall. 4 credits. Prerequisites: Chemistry 358 or 360 and 390 or 288 or equivalents. Not offered 1983–84.

Lecs, M W F 10:10.  
Biochemical systems, bioenergetics, enzymes, metabolic pathways, chemical evolution. This course forms the chemical basis for the graduate program in molecular biology.]

**672 Enzyme Catalysis and Regulation** Spring. 4 credits. Primarily for graduate students in chemistry and biochemistry. Prerequisites: Chemistry 358 or 360 and 390 or equivalents, and a course in general biochemistry.

Lecs, M W F 9:05 and occasionally W 7 p.m. G. G. Hammes.  
Protein structure and dynamics; steady-state and transient kinetics; binding isotherms; chemical modification enzymes; application of NMR, EPR, and fluorescence; acid-base catalysis; allosterism; discussion of specific enzymes to illustrate general principles.

**[677 Chemistry of Nucleic Acids]** Fall. 4 credits. Primarily for graduate students. Prerequisites: Chemistry 358 or 360, and 390 or equivalents. S-U grades only. Not offered 1983–84.  
Lecs, M W 10–11:10. D. A. Usher.  
Properties, synthesis, and reactions of nucleic acids.]

**678 Thermodynamics** Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 or equivalents.  
Lecs, T R 8:30–9:55; disc to be arranged. J. H. Freed.

Development of the general laws of equilibrium and nonequilibrium thermodynamics. Applications to the study of physicochemical equilibrium and steady states in gases, liquids, solids, and liquid solutions.

**681 Physical Chemistry III** Fall. 4 credits.

Prerequisites: Chemistry 288 or 390; Mathematics 214, 215, 216, 217, and Physics 208; or equivalents. Lecrs, M W F 10:10 and occasionally W 7:30 p.m. M. J. Sienko.

An introduction to the principles of quantum theory and statistical mechanics, atomic and molecular spectra, and elementary valence theory. At the level of *Atoms and Molecules* by Karplus and Porter.

**[686 Physical Chemistry of Proteins]** Spring.

4 credits. Primarily for graduate students. Prerequisites: Chemistry 288 or 390 or equivalents. Offered alternate years. Not offered 1983–84. Lecrs, M W F 8, plus one hour to be arranged, and occasionally W 7:30 p.m. H. A. Scheraga. 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.]

**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.

**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.

Hours to be arranged. F. W. McLafferty.

**[716 Selected Topics in Advanced Inorganic Chemistry]** Fall. 3 credits. Prerequisite: Chemistry 390 or equivalent. Not offered 1983–84.

Lecrs, T R 12:20. B. K. Carpenter.]

**765 Physical Organic Chemistry I** Spring. 4 credits. Primarily for graduate students.

Prerequisite: Chemistry 665 or permission of instructor. Lecrs, M W F 11:15. C. F. Wilcox. Continues and extends the approach of Chemistry 665 to more complicated organic reactions. Emphasis is on applications of reaction kinetics and isotope effects to gain an understanding of reaction mechanisms.

**[766 Physical Organic Chemistry II]** Spring. 3 credits. Primarily for graduate students.

Prerequisite: Chemistry 765 or permission of instructor. Not offered 1983–84. Quantitative aspects of organic chemistry.]

**[770 Selected Topics in Organic Chemistry]** Fall. 3 credits. Primarily for graduate students.

Prerequisites: Chemistry 665–666 or permission of instructor. Not offered 1983–84. Lecrs, M W 11:15. J. R. Rasmussen. Carbohydrate chemistry—the analysis, synthesis, and biological significance of complex carbohydrates.]

**[774 Chemistry of Natural Products]** Fall. 3 credits. Primarily for graduate students.

Prerequisites: Chemistry 665–666. Not offered 1983–84. Lecrs, T R 12:20. Particular attention is devoted to methods of structure determination and synthesis as applied to selected terpenes, steroids, alkaloids, and antibiotics.]

**780 Principles of Chemical Kinetics** Fall.

4 credits. Prerequisite: Chemistry 681 or permission of instructor. Lecrs, M W F 11:15. E. R. Grant.

Principles and theories of chemical kinetics; special topics such as fast reactions in liquids, enzymatic reactions, energy transfer, and molecular beams.

**[782 Special Topics in Biophysical and Bioorganic Chemistry]** Spring. 3 credits. Not offered 1983–84.

Lecrs, T R 11:15. Topics vary from year to year.]

**789 X-Ray Crystallography** Spring; offered only when sufficient registration warrants. 4 credits.

Prerequisite: Chemistry 288 or 390 or permission of instructor. Lecrs, M W F 10:10. J. C. 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. At the level of Ladd and Palmer's *Structure Determination by X-ray Crystallography*.

**791 Spectroscopy** Fall. 4 credits. Prerequisites: Chemistry 793, Physics 443, or equivalent.

Lecrs, M W F 9:05. A. C. Albrecht. Principles of linear and nonlinear atomic and molecular optical spectroscopies. Theory will include an introduction to density matrix formalism. Topics will be drawn from the current literature and will include work using highly monochromatic radiation as well as studies based on subpicosecond light pulses.

**[792 Scattering Theory for Chemists]** Spring. 3 credits. Not offered 1983–84.

Hours to be arranged. G. S. Ezra. The concepts and methods of scattering theory are described with particular emphasis on applications to problems of chemical interest.]

**793 Quantum Mechanics I** Fall. 4 credits.

Prerequisites: Chemistry 681, coregistration in Mathematics 421, and Physics 431 or equivalents or permission of instructor. Lecrs, T R 8:40–9:55. J. H. Freed. 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 Bohm's *Quantum Theory*.

**794 Quantum Mechanics II** Spring. 4 credits.

Prerequisites: Chemistry 793 or equivalent and coregistration in Physics 432 and Mathematics 422, or permission of instructor. Lecrs, M W F 9:05. G. S. Ezra. Time-dependent phenomena in quantum mechanics and interaction with radiation. Group theory and applications in molecular spectroscopy and electronic structure of atoms and molecules. At the level of Tinkham's *Group Theory in Quantum Mechanics*.

**796 Statistical Mechanics (also Physics 562)** Spring. 4 credits. Primarily for graduate students.

Prerequisite: Chemistry 793 or equivalent. Lecrs, T R 8:30–9:55. B. Widom. Thermodynamic assemblies; Legendre transformation. Ergodic and information theory ideas. Ensembles and partition functions; equivalences and fluctuations; indistinguishability. Thermodynamic properties of ideal gases and crystals; Third Law; chemical equilibria. Imperfect gases; correlation functions and their applications. Ideal quantum gases; Bose-Einstein condensation. Ideal paramagnets. Ising models and lattice gases. At the level of Kubo's *Statistical Mechanics*.

**[798 Selected Topics in Physical Chemistry]**

Spring. 3 credits. Lecrs, T R 9:05. Not offered 1983–84.]

## 'Chinese

See Department of Asian Studies, p. 109, and Modern Languages, Literatures, and Linguistics, p. 152.

## Classics

P. Pucci, chairman; L. S. Abel, F. M. Ahl, K. Clinton, J. E. Coleman, M. L. Cook, J. R. Ginsburg (director of undergraduate studies, 127 Goldwin Smith Hall, 256-3354), G. M. Kirkwood, P. M. Kirkwood, P. I. Kuniholm, G. M. Messing, P. T. Mitsis, (graduate faculty representative)

The Department of Classics provides an interdisciplinary approach to the Greek- and Latin-speaking civilizations of antiquity and to the work of later writers and thinkers who used Latin as their linguistic medium. It also offers, from time to time, courses in other ancient languages of Italy and, every other year, a program in modern Greek. Historical writers, poets, philosophers, and the great architects and artists of Greco-Roman civilization are the subject matter. The department teaches them primarily for their central importance in a humanistic education. The department offers courses in Bronze Age and Classical archaeology and sponsors an archaeological dig at Alambra in Cyprus. Here at Cornell it has a fine collection of ancient artifacts, reproductions of ancient sculpture, and one of the few laboratories in the world that 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, Roman law, 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 a course in the Greek and Latin elements that make up well over half of modern English usage, and programs in Latin and Greek at the elementary level; another course deals with Greek and Latin elements in bioscientific vocabulary. For the more ambitious there are courses involving the 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. 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.

## The 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 courses in Greek or Latin (courses numbered 201 or above) and 15 credits in related subjects selected after a conference with the adviser.

### Classical civilization

Those who major in Classical civilization must complete (a) 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 (courses in the humanities selected in conference 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). One or more courses offered by the Department of Comparative Literature may be counted towards the required 24 credits of Greek if the student obtains the prior approval of the major adviser.

## 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 also must complete successfully 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 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.

## 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. 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 regular and summer programs for qualified graduate students. Detailed information on these programs is available in the Department of Classics Office, 120A Goldwin Smith Hall.

## Placement in Latin

Placement of first-year students in Latin courses is determined by an examination given by the Department of Classics during orientation week or, if necessary, in the second half of the fall term.

## Classical Civilization

**[100 Word Power: Greek and Latin Elements in the English Language]** Fall. 3 credits. Not offered 1983–84.

G. M. Messing.

This course gives the student with no knowledge of Classical languages an understanding of how the Greek and Latin elements, which 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.]

**[102 Word Power for the Biological Sciences]** Fall. 3 credits. Not offered 1983–84.

M W F 11:15. M. Cook.

This course teaches 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 these elements and the rules of word formation will usually recognize the basic meaning of any unfamiliar word in this field. Attention will also be paid to misinformations, common errors, and words still in use that reflect scientific theories since rejected.]

**120 Freshman Seminar in Latin Literature** Fall or spring. 3 credits.

Fall: M W F 10:10; spring: M W F 12:20.

J. Ginsburg.

*Slave and free in ancient Rome.* Could a Roman master kill his slave with impunity? How did women cement alliances between important political families? Why was commerce considered an unsuitable occupation for a gentleman? These are some of the questions we will address in this examination of the various social, political, and economic divisions in Roman society (slave and free, male and female, rich and poor), as they are elucidated in Latin literature, contemporary documents, and the art of the period

**121 Freshman Seminar in Classical Archaeology**

Fall and spring. 3 credits. Fall: M W F 10:10;

spring: M W F 12:20.

Ancient civilizations of the Mediterranean world. The ancient Mediterranean world produced such important cultures as those of the Egyptians, Mycenaeans and Minoans, Phoenicians, Greeks, and Romans. In this course we shall examine the rise and fall of the great civilizations of the Mediterranean basin and compare these cultures in terms of their writing systems, political and economic organizations, religion, trade, and architecture. Topics covered include the environment and natural resources of the Mediterranean regions, the development of writing, the opium trade in the eastern Mediterranean, and the causes of the rise and fall of Mediterranean empires.

**150 Freshman Seminar in Greek and Roman Myths**

Fall and spring. 3 credits.

M W F 8, 1:15, or 2:30. Staff.

An introductory course on the myths of Greece and Rome for students interested in acquiring a basic background in Greek and Roman myths and legends as they occur in ancient literature and art. It should serve as a foundation for those interested in pursuing various theories as well as for those seeking to improve their grasp of mythical motifs in later European and American literature. But the primary purpose will be to acquaint the student with the stories themselves and, where appropriate, to compare Greek and Roman myths with those of the Celts and other European peoples.

**[200 Mediterranean Archaeology (also Near Eastern Studies 280)]** Fall. 3 credits. Not offered 1983–84.

An examination of the archaeological bases of ancient Mediterranean civilization, with special focus on contacts and interrelationships in the Bronze Age. Topics include: the rise of civilization in Egypt; the Bronze Age states of Syro-Palestine (Ebla, Ugarit, Byblos, et cetera); the Hittites and Bronze Age Anatolia; Minoans, Mycenaeans, and their eastern and western contacts; the role of Cyprus; the invention and spread of writing; and ancient shipping and trade. Lectures by instructors will be supplemented with talks by other scholars from Cornell and elsewhere.]

**211 The Greek Experience** Fall. 3 credits.

M W F 11:15. M. Cook.

An introduction to the literature and thought of ancient Greece with emphasis on their oral and dramatic presentation and intellectual and visual contexts. There will be an analysis of tragedy and comedy, satire, and epic and lyric poetry; also selected prose works, augmented by films, slides, play readings, and individual student interpretations.

**212 The Roman Experience** Spring. 3 credits

M W F 11:15. J. Ginsburg.

An introduction to the civilization of the Romans as expressed in their literature, art, and social and political institutions. This course will examine not only the intellectual life of the Romans, but what it meant for men and women of all social classes to live in the Roman world. Selected readings in translation of works of literature, history, and philosophy, supplemented by slides and other visual materials.

**[222 The Individual and Society in Classical Athens]** Spring. 3 credits. Prerequisite: Classics 211 or 220 or History 161, 265, or 266 or permission of instructor. Not offered 1983–84.

From Classical Athens (fifth and fourth centuries B.C.) come many of the most outstanding achievements in Western civilization: in literature, art, philosophy, historical writing, and the sciences. This course will survey Athenian daily life and discuss Athenian society with a view to isolating aspects that facilitated the development of the individual and individual achievement. Topics will include: family life, education, economics, government, material culture, religion, and social structure. Political and military history, while not totally disregarded, will not be of primary concern.]

**[224 Greek Philosophy]** Fall. 3 credits. Not offered 1983–84.

An introduction to the pre-Socratic philosophers and Plato.]

**[225 Hellenistic and Roman Philosophy]** Spring 3 credits. Not offered 1983–84.

An introduction to Aristotle and later Greek and Roman philosophy, including Stoicism and Epicureanism.]

**236 Greek Mythology (also Comparative Literature 236)** Fall. 3 credits.

T R 8:40–9:55. G. Messing.

A survey of the Greek myths, with emphasis on the myths that have entered the postclassical Western tradition. Of the aspects of mythology to be studied the following will be among the most important: what "myth" meant to the Greeks; the factors and influences involved in the creation of myths; and the significance of myths in daily life, religion, and thought. Comparison and contrast to Roman myths will also be included.

**[237 Greek and Roman Mystery Religions]**

Spring. 3 credits. Not offered 1983–84.

M W F 11:15. K. Clinton.

The development and character of Mystery cults from the original Mysteries of Demeter and Persephone to the Christian Mysteries. The cults include the Kabirot, the Great Gods of Samothrace, Dionysus, Osiris, and other cults of Asia Minor and the Near East. Investigation will focus on the distinctive features of the Mystery cults that contributed to their success.]

**[238 The Ancient Epic]** Spring. 3 credits. Not offered 1983–84.

M W F 11:15. K. Clinton.

A close reading of the Homeric epics and Vergil's *Aeneid*. The *Iliad* and the *Odyssey* will be considered as oral poetry and in terms of their place in a traditional society but with reference to modern interpretations. The *Aeneid* will be read as a major rewriting of Homer designed for a new audience.]

**[245 Greek and Roman Historians]** Fall 3 credits. Not offered 1983–84.

M W F 12:20. J. R. Ginsburg.

Study of historical writing in antiquity through selected readings (in translation) from the Greek and Roman historians. Among the topics to be examined are the historian's task as understood by the ancients; the method, narrative technique, and accuracy of the Greek and Roman historians; and their attitudes to the events which they relate.]

**[300 Greek and Roman Drama (also Comparative Literature 300)]** Spring. 4 credits. Not offered 1983–84.

T R 10:10–11:35. G. M. Kirkwood.

A study of ancient tragedy and comedy as exemplified by representative plays, read in translation, of Aeschylus, Sophocles, Euripides, Aristophanes, Menander, Plautus, Terence, and Seneca. Main emphasis is on the development of Greek tragedy. Consideration also of the development of Greek theater (illustrated) and its

relationship to the form and presentation of the dramas, the origins of tragedy, and the influence of Greek tragedy and Seneca on later European drama.]

**[333 Latin Foundations of Western Literature (also Comparative Literature 333)]** Spring. 4 credits. Not offered 1983–84.]

**[336 Foundations of Western Thought (also Comparative Literature 336)]** Fall. 4 credits. Not offered 1983–84.

M W F 2:30. P. Mitsis.

The Greeks and Romans first raised many of the central questions that have long preoccupied Western thinkers: Is belief in a god rational or just a matter of faith? Are there objective ethical and political values? Are we responsible for our actions if everything in the world is causally determined? What is the relation of science and politics, and is scientific thinking just another form of myth? We will examine the cultural, political, and religious contexts in which such questions first arise and assess the distinctively Greek and Roman responses given by Classical tragedians, historians, philosophers, and religious thinkers. Authors examined will include Homer, Heraclitus, Aeschylus, Sophocles, Thucydides, Plato, Aristotle, Epicurus, the Stoics, St. Paul, and Augustine.]

**[337 Ancient Philosophy of Science]** Spring. 4 credits. Not offered 1983–84.

M. Cook.

The development of scientific method by the ancient Greeks: the pre-Socratic philosophers, Aristotle, the ancient atomists, and the medical writers (Hippocrates, Galen, and the empiricists).]

**[339 Ancient Wit: An Introduction to the Theory and Form of Comic and Satiric Writing in Greece and Rome (also Comparative Literature 339)]** Spring. 4 credits. Not offered 1983–84.

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 Relations 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.]

**340 Ancient Greek Constitutions** Spring. 3 or 4 credits. Prerequisite: survey of Greek history, a course in Greek civilization, ability to read Greek, or permission of instructor.

T R 12:20. 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 Mycenaean kingdoms 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 will be considered. Required readings will be in translation. For those who can read Greek, an additional hour will be arranged each week to study selected documents in the original.

**[363 Women in Classical Greece and Rome]** Spring. 4 credits. Not offered 1983–84.

L. S. Abel.

In this course students will examine the evidence about the social and political position of women in ancient Greece and Rome. The purpose will be to trace the origins of some Western attitudes about women and to address general historical questions about the nature of the evidence, basic chronology, and the development of political systems.]

**465–466 Independent Study in Classical Civilization, Undergraduate Level** 465, fall; 466, spring. Up to 4 credits.  
Hours to be arranged.

**[610 Language of Myth (also Anthropology 610)]** Spring. 4 credits. Not offered 1983–84.

P. Pucci.

An analysis of the theories on language leading to Levi-Strauss and Derrida.]

**[681 Patristic Seminar: Graduate]** Fall or spring. 4 credits. Not offered 1983–84.]

**711–712 Independent Study for Graduate Students in Classical Civilization** 711, fall; 712, spring. Up to 4 credits.

Hours to be arranged.

## Greek

**101 Greek for Beginners** Fall and spring. 4 credits.

M T W F 12:10. Staff.

Introduction to Attic Greek. Designed to enable the student to read the ancient authors as soon as possible.

**103 Attic Greek** Fall and spring. 4 credits. Prerequisite: Classics 101 or equivalent.

M T W F 12:20. Staff.

A continuation of Classics 101.

**111–112 Modern Greek** 111, fall; 112, spring. 3 credits.

M W F 9:05. G. M. Messing.

**201 Attic Authors** Fall. 3 credits. Prerequisite: Classics 103 or equivalent.

M W F 1:25. M. Cook.

Selected readings from Plato, Thucydides, and Euripides.

**203 Homer** Spring. 3 credits. Prerequisite: Classics 103 or equivalent.

M W F 9:05. G. Kirkwood.

Readings in the Homeric epic.

**204 Plato** Spring. 3 credits. Prerequisite: Classics 103 or equivalent.

M W F 1:25. Staff.

Selected readings from Plato.

**209 Greek Composition** Fall. 2 credits. Prerequisite: Classics 203 or equivalent.

T R 10:10–11:35. P. Pucci.

**210 Greek Composition** Spring. 2 credits. Prerequisite: Classics 209 or equivalent.

T R 10:10–11:35. P. Pucci.

**[301 Greek Historians]** Fall. 4 credits. Prerequisite: Classics 203 or 204 or equivalent. Not offered 1983–84.

J. E. Coleman.

Topic varies. In 1981–82 the course consisted of reading (in Greek) and study of selected passages from Herodotus.]

**[302 Greek Tragedy]** Fall. 4 credits. Prerequisite: Classics 203 or equivalent. Not offered 1983–84.

G. M. Kirkwood.]

**303 Readings in Greek Rhetoric** Fall. 4 credits. M W F 9:05. P. Mitsis.

An examination of the development of Greek rhetorical theory and practice from Antiphon to Dinarchus. Consideration will be given not only to the methods and techniques of Attic oratory, but also to its legal and political context. These texts will also be studied as important sources for the Greeks' views on such ethical questions as the nature of responsibility, moral obligations between citizens, and the morality of war.

**305 Attic Comedy** Spring. 4 credits. Prerequisite: Classics 203 or 204 or equivalent.

M W F 2:30. M. Cook.

**[306 Greek Melic, Elegiac, and Bucolic Poetry]** Spring. 4 credits. Prerequisite: Classics 203 or 204 or equivalent. Not offered 1983–84.

G. Kirkwood.]

**[307 Plato]** Fall. 4 credits. Prerequisite: Classics 203 or 204 or equivalent. Not offered 1983–84.

M W F 11:15. P. T. Mitsis.

Plato on egoism, love, and friendship: *Lysis* and *Symposium*.]

**[308 New Testament Greek]** Spring. 4 credits. Prerequisite: two terms of 200-level Greek or permission of instructor. Not offered 1983–84.

Readings in New Testament texts discussed in seminar format, with one session a week devoted exclusively to problems with language and translation exercises.]

**[310 Greek Undergraduate Seminar]** Fall or spring. 4 credits. Prerequisite: two terms of 200-level Greek or permission of instructor. Not offered 1983–84.]

**340 Ancient Greek Constitutions** Spring.

4 credits. Prerequisites: survey of Greek history, a course in Greek civilization, ability to read Greek, or permission of instructor.

T R 12:20, additional sec to be arranged.

L. Abel.

See description under Classical Civilization.

**401–402 Independent Study in Greek, Undergraduate Level** 401, fall; 402, spring. Up to 4 credits.

Hours to be arranged.

**417 Advanced Readings in Greek Literature** Fall. 4 credits. Intended for advanced undergraduates and graduate students. Prerequisite: two terms of 300-level Greek or permission of instructor.

M W F 12:20. P. Pucci.

Readings of Homer comparing the ideas, style, and tone of the *Iliad* and the *Odyssey*.

**[418 Advanced Readings in Greek Literature]**

Spring. 4 credits. Intended for advanced undergraduates and graduate students. Prerequisite: two terms of 300-level Greek or permission of instructor. Not offered 1983–84.

P. Pucci.]

**419 Advanced Greek Composition** Fall. 2 credits. Prerequisite: Classics 209–210, or equivalent.

Hours to be arranged. G. M. Messing.

**[442 Greek Philosophy]** Fall or spring. 4 credits. Not offered 1983–84.]

**[671 Seminar in Greek: Graduate]** Fall. 4 credits. Not offered 1983–84.

T 3–5. P. Pucci.]

**672 Seminar in Greek: Graduate** Spring. 4 credits.

T 3–5. G. Kirkwood.

**701–702 Independent Study for Graduate Students in Greek** 701, fall; 702, spring. Up to 4 credits.

Hours to be arranged.

## Latin

**105 Latin for Beginners** Fall or spring. 4 credits.

Fall: M T W F 8, P. Kirkwood; M T W F 10:10,

P. Mitsis; M T W F 1:25, staff. Spring: M T W F 8,

P. Kirkwood.

An introductory course in the essentials of the Latin language, designed for rapid progress toward reading the principal Latin writers.

**106 Elementary Latin** Fall or spring. 4 credits. Prerequisite: Classics 105 or placement by departmental examination.

Fall: M T W F 10:10, staff. Spring: M T W F 8, staff; 10:10, P. Kirkwood; 1:25, P. Mitsis.

A continuation of Classics 105, using readings from various authors.

**108 Latin in Review** Fall. 3 credits. Prerequisite: placement by departmental examination. M W F 11:15. Staff.

**205 Intermediate Latin** Fall. 3 credits.

Prerequisite: Classics 106 or 108 or placement by departmental examination.

Sec 1, M W F 10:10, staff; sec 2, M W F 1:25, J. Ginsburg.

*Conspiracy at Rome.* Readings from Cicero's four speeches against Catiline, the leader of a plot to seize control of the Roman state. Class discussion will focus on these speeches as examples of the art of persuasion in the Roman world and on the Catilinarian Conspiracy as an historical event.

**207 Catullus** Spring. 3 credits. Prerequisite: Classics 106 or 108 or one term of 200-level Latin. M W F 2:30. Staff.

Readings from Catullus's poetry, with emphasis on the traditions of love poetry, the poet's relation to his society, and other literary topics.

**[208 Roman Drama]** Spring. 3 credits. Prerequisite: Classics 106 or 108 or one term of 200-level Latin. Not offered 1983–84.

F. M. Ahl.]

**216 Vergil** Spring. 3 credits. Prerequisite: one term of 200-level Latin.

M W F 11:15. Staff.

Selections from Vergil's *Aeneid* will be read with emphasis on Vergil's use of the epic tradition, his own poetic milieu, his poetic techniques, and his relation to the politics of his time.

**[241 Latin Composition]** Fall. 2 credits.

Prerequisite: Classics 106 or 108 or equivalent. Not offered 1983–84.

T R 2:30. P. Pucci.]

**[242 Latin Composition]** Spring. 2 credits.

Prerequisite: Classics 241 or equivalent. Not offered 1983–84.

Staff.]

**[312 Latin Undergraduate Seminar]** Fall or spring. 4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor. Not offered 1983–84.]

**[314 The Augustan Age]** Fall. 4 credits

Prerequisite: two terms of 200-level Latin. Not offered 1983–84.

M W F 9:05. F. M. Ahl.]

**[315 Roman Satire]** Spring. 4 credits. Prerequisite: two terms of 200-level Latin. Not offered 1983–84.

E. Adler.]

**[316 Roman Philosophical Writers]** Fall. 4 credits. Prerequisite: two terms of 200-level Latin. Not offered 1983–84.

P. T. Mitsis.

Selected readings from Lucretius' *De Rerum Natura* and Cicero's *De Finibus*.]

**317 Roman Historiography** Spring. 4 credits.

Prerequisite: one term of 300-level Latin or permission of the instructor.

M W F 1:25. J. R. Ginsburg.

Readings from Sallust and Tacitus with particular attention to narrative technique.

**318 Roman Elegy: Tibullus, Propertius, Ovid**

Fall. 4 credits. Prerequisite: two terms of 200-level Latin.

M W F 11:15. Staff.

**[366 Late Latin]** Spring. 4 credits. Prerequisite: permission of the instructor. Not offered 1983–84.]

**368 Medieval Latin Literature** Fall. 4 credits

Prerequisite: Classics 214 or permission of instructor.

T R 2:30–3:45. Staff.

Medieval Latin texts and their historical and cultural contexts are closely studied. Each term the course will concentrate on two or three topics, such as particular authors, genres, or periods.

**411 Advanced Readings in Latin Literature** Fall.

4 credits. For advanced undergraduates and graduate students. Prerequisite: two terms of 300-level Latin or permission of instructor.

M W F 2:30. Staff.

**441 Advanced Latin Composition** Spring.

2 credits. For undergraduates who have completed Latin 241–242 and for graduate students.

**451–452 Independent Study in Latin,**

**Undergraduate Level** 451, fall; 452, spring. Up to 4 credits.

Hours to be arranged.

**[460 The Latin Poems of Milton]** Fall. 4 credits.

Prerequisite: two semesters of 300-level Latin. Not offered 1983–84.]

**679 Seminar in Latin: Graduate** Fall. 4 credits

R 3–5. Staff.

**680 Seminar in Latin: Graduate** Spring. 4 credits.

R 3–5. P. Mitsis.

Topic to be announced.

**751–752 Independent Study for Graduate**

**Students in Latin** 751, fall; 752, spring. Up to 4 credits.

Hours to be arranged.

## Classical Archaeology

**[206 The Rise of Classical Greece]** Fall. 3 credits. Not offered 1983–84.

Archaeology of the Greek dark ages. Topics include site reports, pottery, metalworking, the introduction of the alphabet, the beginnings of coinage, and links with Anatolia and the Near East.]

**220 Introduction to Art History: Art of the**

**Classical World** Fall. 3 credits.

M W F 9:05. A. Ramage.

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.

**[221 Minoan-Mycenaean Art and Archaeology**

**(also History of Art 221)]** Spring. 3 credits. Not offered 1983–84.

M W F 10:10. J. E. 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. Topics also include Cyprus as an intermediary between the Aegean and the Levant, the effects of the volcanic eruptions of Thera (possibly Plato's Atlantis), and the evidence of Homer and the Greek myths.]

**232–233 Archaeology in Action I and II** 232, fall;

233, spring. 3 credits each term. Prerequisites:

Archaeology 100, Classics 220, or permission of the instructor.

M 2:30–4:25; two labs to be arranged.

P. I. Kuniholm.

Objects from the Classical, Hellenistic, and Roman periods are "dug" out of Cornell basements, identified, cleaned, restored, catalogued, and photographed and are considered in their appropriate historic, artistic, and cultural contexts.

**309 Dendrochronology of the Aegean** Fall or

spring. Up to 4 credits. Limited to 10 students.

Prerequisite: permission of the instructor.

M 12:10–2:15; two labs to be arranged.

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.

**[320 Arts and Monuments of Athens (also History of Art 320)]** Fall. 4 credits. Prerequisite: Classics 220 or permission of instructor. Not offered 1983–84.]

**[321 Archaeology of Cyprus (also History of Art**

**321)]** Spring. 4 credits. Prerequisite: Classics 220 or permission of instructor. Not offered 1983–84.

Study of Cyprus from its first settlement in the Neolithic period until the end of the ancient world. Special emphasis on the Bronze Age, the acme of Cypriot culture, and the neighboring civilizations. Lectures and oral reports by students. Students will have the opportunity to examine and study original unpublished material from the Cornell excavation at Alambra and study the collection.]

**[322 Greeks and Their Eastern Neighbors (also History of Art 328)]** Spring. 4 credits. Prerequisite: Classics 220, 221, or permission of the instructor. Not offered 1983–84.

J. E. Coleman.

A study of the archaeological and other evidence for the interaction between Greek civilization and the Eastern and Western Mediterranean from the thirteenth to the fourth centuries B.C.E. The course will focus on Greek relationships with Phoenicia and the rest of the Levant, Cyprus, Anatolia, and the Etruscans in the post-Bronze Age period.]

**323 Painting in the Greek and Roman World (also History of Art 323)]** Spring. 4 credits.

M W F 2:30. A. Ramage.

Vase painting, wall painting, and mosaics from the ancient Mediterranean world will be studied in conjunction with the testimony of Greek and Roman sources. An attempt will be made to grasp the concerns and achievements of the Classical painters.

**[325 Greek Vase Painting (also History of Art 325)]**

Fall. 4 credits. Not offered 1983–84.

A stylistic and iconographical approach to an art in which the Greeks excelled. The course will be arranged chronologically, from the early (eleventh century B.C.) anonymous beginnings to the "personal" hands of identifiable masters of the fifth and fourth centuries B.C. Styles other than Attic will be stressed.]

**[326 Art and Archaeology of Archaic Greece**

**(also History of Art 326)]** Fall. 4 credits. Not offered 1983–84.

A study of the formative period of Classical Greek civilization, based primarily on the evidence of art and archaeology. Attention is concentrated on the beginnings and early developments of architecture, sculpture, and painting.]

**327 Greek and Roman Coins (also History of Art 327)]** Spring. 4 credits.

M W F 2:30. A. Ramage.

The varied issues of Greek cities and the Roman state are examined. Coins are considered as art objects as well as economic and historical documents. The changes in design, value, and metals from the origins of coinage to the Late Roman period are studied. Lectures, student presentations, and work with actual examples.

**[329 Greek Sculpture (also History of Art 329)]**

Fall. 4 credits. Not offered 1983–84.

Study of ancient Greek sculptural techniques and achievements in marble and bronze. Detailed examination of a selection of works to illustrate sculptural development.]



**[330 Art in Pompeii: Origins and Echoes (also History of Art 330)]** Spring. 4 credits. Not offered 1983–84.

Greek and Roman art in the context of the daily life of a provincial Italo-Greek town. The interrelation of art and household objects in classical culture will be stressed, and earlier traditions will be described. Subsequent development of Roman minor arts will be covered, as well as the discovery of Pompeii and its effect on European taste.]

**[350 Arts of the Roman Empire (also History of Art 322)]** Spring. 4 credits. Not offered 1983–84. The visual arts in the service of the first world state. The course starts with the Etruscan and Republican period but concentrates on monuments of the imperial era in Italy and the provinces until the time of Constantine.]

**[423 Ceramics (also History of Art 423)]** Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1983–84.  
W 2:30–4:30. A. Ramage.]

**629 Seminar In Classical Archaeology** Fall. 4 credits.  
W 3–5. Staff.

**[630 Seminar In Classical Greek Archaeology: Graduate]** Spring. 4 credits. Not offered 1983–84.]

## Classical Linguistics

**[420 History of the Greek Language]** Fall. 3 credits. Not offered 1983–84.  
M W F 9:05. G. M. Messing.

Graduate students in Classics will be expected, in addition, to register in Classics 419, Advanced Greek Composition. Lectures and assigned readings will cover the evolution of Greek from Indo-European and its subsequent development up to the Koine.]

**[422 History of the Latin Language]** Spring. 3 credits. Not offered 1983–84.  
G. M. Messing.]

**423 Vulgar Latin** Spring. 4 credits. See also Romance Linguistics.

Hours to be arranged. G. M. 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.

**[424 Italic Dialects]** Fall or spring. 4 credits. Not offered 1983–84.]

**[425 Greek Dialects]** Fall. 4 credits. Not offered 1983–84.

Hours to be arranged. G. M. Messing.  
Selected inscriptions will be read in the various ancient Greek dialects, including Mycenaean.]

## Honors Courses

**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.

**471 Honors Course** Fall. 4 credits. To be taken in the senior year.  
A continuation of Classics 370, with change of author or topic.

**472 Honors Course: Senior Essay** Spring. 4 credits. For students who have successfully completed Classics 471.  
Topics must be approved by the honors adviser at the end of the first term of the senior year.

## Society for the Humanities Seminars of Interest to Classics Students

**Parents and Children in Athens and Jerusalem (Society for the Humanities 381–382)** 381, fall; 382, spring.  
C. Kronfeld, B. Strauss.

**Virgil's Eclogues: Images of Cultural Change (Society for the Humanities 413)** Fall.  
A. Patterson.

**The Myth of Orpheus (Society for the Humanities 415)** Fall.  
F. Graf.

**A Pagan Saint: Philostratus's Life of Apollonius (Society for the Humanities 416)** Spring.  
F. Graf.

**The Aristotelian Tradition in the Early and High Middle Ages (Society for the Humanities 417)** Fall.  
J. Murdoch.

**The Aristotelian Tradition in the Later Middle Ages (Society for the Humanities 418)** Spring.  
J. Murdoch.

**Thinking One's Way Back into the Past (Society for the Humanities 423)** Fall.  
F. Ahl.

**Narcissus at the Well (Society for the Humanities 424)** Spring.  
F. Ahl.

## Comparative Literature

W. W. Holdheim, chairman (244 Goldwin Smith Hall, 256-4155); C. M. Carmichael (graduate faculty representative), W. Cohen (director of undergraduate studies), W. J. Kennedy, with J. Culler (English), D. I. Grossvogel (Romance Studies), P. Hohendahl (German), E. Rosenberg (English)

Also cooperating: M. H. Abrams, C. Moron-Arroyo, J. P. Bishop, E. A. Blackall, E. G. Fogel, G. Gibian, S. L. Gilman, A. V. Grossvogel, C. Kaske, R. E. Kaske, G. M. Kirkwood, C. Levy, H. S. McMillin, T. Murray

The Department of Comparative Literature provides a broad range of courses in European and, to some extent, non-European literatures. Courses variously stress central authors, themes, problems, styles, genres, historical periods, and theoretical perspectives. The department offerings exemplify several current interdisciplinary approaches to literary study—for example, 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 see the director of undergraduate studies. Upon 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 pursuit of personal interests. The specific contours of such a program are worked out in consultation between student and adviser.

## Requirements for the Major

The student must complete:

- 1) five courses in comparative literature at the 200 level and above. A student may include up to two literature courses from other departments.
- 2) five literature or civilization courses at the 200 level and above in at least one foreign literature department. Texts must be read in the original language. A student may offer one language course (conversation, composition, etc.).
- 3) a two-semester senior essay (Comparative Literature 493–494, Senior Essay) of roughly fifty pages, normally 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), intensive study of a single genre (e.g., Comparative Literature 363–364, The European Novel), and analysis of problems in literary theory (e.g., Comparative Literature 295, Introduction to Semiotics, or Comparative Literature 381, Marxist Cultural Theory).
- 2) additional course work in language, literature, and related disciplines in the humanities and social sciences.
- 3) a second foreign language, especially for those 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 quality of the student's senior essay, course work for the major, and overall academic performance at Cornell.

For further information, students should contact the Department office, 244 Goldwin Smith Hall, telephone: 256-4155.

## Freshman Seminars

Any 100-level course may be used toward satisfying the Freshman Seminar requirements. Full descriptions of Freshman Seminar Program offerings may be found on page 205.

## Courses

**201–202 Great Books** 201, fall; 202, spring. 4 credits. Comparative Literature 201 and 202 may be taken independently of each other.  
M W F 10:10. Staff.

A reading each semester of seminal texts that represent and have often shaped Western culture and ought to be part of every college student's education. By analyzing, interpreting, and evaluating them, students will develop essential critical reading abilities. 201: selections from antiquity to the Renaissance. 202: selections from the Renaissance to the present.

**236 Greek Mythology (also Classics 236)** Fall. 3 credits.  
T R 8:40–9:55. G. Messing.

A survey of the Greek myths, with emphasis on the myths that have entered the postclassical Western tradition. Of the aspects of mythology to be studied the following will be among the most important: what "myth" meant to the Greeks; the factors and influences involved in the creation of myths; and the significance of myths in daily life, religion, and thought. Comparison and contrast to Roman myths will also be included.

**[312 Comedy]** Not offered 1983–84.  
W. J. Kennedy.]

**315 Rhetoric and Technology** Spring. 4 credits  
M W F 12:20. W. J. Kennedy.  
A study of ways in which communication between authors and audiences undergoes changes through

the influence of various media in texts from oral, literate, and advanced technological cultures. Readings include works by Plato, Dante, Swift, Nietzsche, Joyce, Borges.

**326 Christianity and Judaism** Spring. 4 credits. Not open to freshmen.

T R 10:10–11:25. 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*.

**328 Literature of the Old Testament** Fall. 4 credits. Not open to freshmen.

T R 10:10–11:25. C. M. Carmichael.

Analysis of selected material in translation.

**343 Medieval Literature** Spring. 4 credits.

M W F 12:20. R. E. Kaske.

Analysis and interpretation of great medieval literary works in translation. Though readings will vary somewhat from year to year, a typical program would be *Beowulf*; the *Nibelungenlied*; *Njalssaga*; a romance of Chretien; Wolfram's *Parzival*; Gottfried's *Tristan* and/or *Sir Gawain and the Green Knight*.

**344 Dante in Translation (also Italian 334)**

Spring. 4 credits.

M W F 10:10. R. Jacoff.

The literary, intellectual, and moral complexities of this fundamental work in our poetic and spiritual history are examined critically. From close readings of some celebrated passages from the earliest works through *Paradiso*.

**352 Classic and Renaissance Drama (also Theatre Arts 325)** Fall. 4 credits.

M W F 9:05. A. Caputi.

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.

**353 European Drama, 1660 to 1900 (also Théâtre Arts 326)** Spring. 4 credits.

M W F 2:30. R. Gross.

Readings from major dramatists from Corneille to Chekhov, including such authors as Molière, Congreve, Marivaux, Goldoni, Gozzi, Schiller, Kleist, Gogol, Ostrovski and Ibsen.

**354 Modern Drama (also Theatre Arts 327)** Fall. 4 credits.

M W F 1:25. S. Williams.

A study of the major currents of modern drama against the background of modern culture. Readings will include Ibsen, Strindberg, Chekhov, Shaw, Pirandello, O'Neill, Brecht, Beckett, Genet, and contemporary American and European playwrights.

**363–364 The European Novel** 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, W. Cohen; spring: T R 12:20–1:35, E. Rosenberg.

Closed reading of English and Continental novels from 1600 to 1950. 363: Cervantes to Dostoevsky. 364: Tolstoy to Gide. The novelists to be studied include Fielding, Stendhal, Balzac, Dickens, Flaubert, Mann, and Nabokov. Analysis of novelistic subgenres: picaresque fiction, Gothic romance, historical novel, moral fable, *récit*, detective story, and *Bildungsroman*.

**388 Politics and the Novel (also Russian 388)** Fall. 4 credits.

M W F 9:05. G. Gibian.

From the French Revolution to the present. Literary representations of conflicts between political ideologies (ideas of revolution, justice, nationalism)

and private needs (art, nature, love, order). Marx, Flaubert, Dostoevsky, Conrad, Henry James, Trotsky, Lenin, V. S. Naipaul, Solzhenitsyn, Kundera. Some poetry will also be included: Yeats, Mayakovsky, Auden. Lectures and discussions.

**392 Literature to Cinema, Cinema to Literature (also Italian 395)** Fall. 4 credits.

T R 12:20–1:35. A. Grossvogel.

A study of the ways literary language has influenced Italian cinema and the ways film language has had an impact on contemporary poetry and prose fiction. The films to be screened will be by Antonioni, Bertolucci, Bolognini, De Sica, Fellini, Pasolini, Soldati, Scola, Taviani, Visconti, Zeffirelli, 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 by Verga, Fogazzaro, D'Annunzio, Pirandello, Pavese, Pratolini, Moravia, Bassani, Calvino, Buzzati, and Ledda.

**393 Narrative and Ideology in Contemporary Italian Literature (also Italian 393)** Fall. 4 credits.

T R 10:10–11:25. A. Grossvogel.

The social, political, and economic frustrations of the south and the alienating effects of industrialization in the north as reflected in postwar Italian narrative. Works by Calvino, Sciascia, Pavese, Vittorini, Levi, Volponi, Balestrini, Gadda, and Moravia will be read. The course will be given either in English or Italian, according to demand. Most of the texts are available in translation.

**398 French Film and Thought: The Untrammelled Eye (also French 399)** Fall. 4 credits.

T R 2:30–3:45. D. Grossvogel.

The importance of undeflected sight in French thought and motion pictures: the privileging of a childlike eye, the child's world, the awareness of freedom. A phenomenological progression illustrated by such films as *Un chien andalou*, *Zéro de conduite*, *Le Sang d'un poète*, *L'Argent de poche*, etc., and such authors as Breton, Camus, Cocteau, Robbe-Grillet, Sartre, etc.

**400 The Japanese Noh Theatre and Modern Dramatists (also Asian Studies 400)** Fall. 4 credits.

M W 2:30–3:45. K. Brazell.

Several weeks will be spent studying the literary, performance, and aesthetic aspects of the Noh theatre. Emphasis will be on Noh as a performance system, a total theatre in which music, dance, text, costume, and props all interact to create the total effect. Then attention will turn to modern theatre people who have reacted to Noh in some creative way. Choice of dramatists will depend partially on student interests but will probably include Yeats, Brecht, Britten, Claudel, Grotowski, and Mishima. All readings may be done in English translation.

**402 The Poetics of Modernism in Literature and Art: Paris, New York, Tel Aviv (also Near Eastern Studies 402)** Spring. 4 credits. Prerequisite: a 200-level or above course in one of the following: English or comparative literature, Hebrew or Yiddish, history of art or aesthetics.

R 2:30–4:30. C. Kronfeld.

This seminar investigates the theory and practice of Euro-American modernist movements in literature and art and their influence on the emergence of modernism in Israel. The manifestos of the various movements will be analyzed against the poetic and artistic principles embedded in the works themselves. Special emphasis will be placed on expressionism and surrealism and on the methodological difficulties of discussing "-isms" across media and cultures.

**411 Studies in the Lyric: Dante, Scape, Yeats** Spring. 4 credits.

W 2:30–4:25. W. J. Kennedy.

Closed reading of the lyric poetry of Dante's *Vita Nuova*, Scape's Renaissance sequence *Delie*, and texts from various stages of Yeats's career.

**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.

**421 Old Testament Seminar** Fall. 4 credits. Limited to 20 students.

T 2:30–4:25. C. M. Carmichael.

Identification and discussion of problems in the Old Testament.

**429 Readings in the New Testament** Fall.

4 credits. Limited to 25 students.

M W F 1:25. 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 in 1983 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.

**561 A Dozen Mollere Plays and Some Lingering Dramatic Problems (also French 561)** Fall. 4 credits.

M 2:30–4:25. D. Grossvogel.

The course will examine such questions as the importance of the farce in the evolution of theater, the Italian influence in France, closed space, patronage and the comedy of manners, *plaire* and the hybrid genres, poetics on stage, limits of comedy, etc.

**593 Narrative and Ideology in Contemporary Italian Literature (also Italian 593)** Fall. 4 credits.

T R 10:10–11:25. A. Grossvogel.

See Comparative Literature 393 for description.

**611 Studies in the Lyric: Dante, Scape, Yeats** Spring. 4 credits.

W 2:30–4:25. W. J. Kennedy.

See Comparative Literature 411 for description.

**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.

**684 Heidegger: A Reading of *Being and Time* (also German Literature 684)** Spring. 4 credits. Prerequisite: permission of instructor.

T 3:35–5:35. C. M. Arroyo.

A reading of *Being and Time* that tries to reproduce the book's own logic (constructive criticism), to unveil the implicit but clear references to Marx, Husserl, Freud, etc. (instructive criticism), and to present the relevance of the book for a literary epistemology.

**693 Marxism, Ideology, Literature (also English 693)** Fall. 4 credits.

T 1:25–3:20. W. Cohen and S. P. Mohanty.

The seminar will address central problems of Marxist literary and cultural criticism, with emphasis on the methodological questions raised by political analysis. An inquiry into the presuppositions of various interpretive strategies will lead us to the recent dialogues between Marxism and psychoanalysis, deconstruction, semiotics, and feminism. On this basis we will develop working definitions of a number of key terms: ideology, history, textuality, form, meaning, value, etc. Such considerations should, in turn, both illuminate and be illuminated by the reading of individual literary texts. The first half of the semester will consist of an overview; the second half will involve collaborative presentations by study groups formed to devote concentrated attention to specific themes or topics. Readings from such theorists as Althusser, Barthes, Eagleton, Gramsci, Jameson, Kristeva, Lukacs, Macherey, Sartre, Williams, and perhaps Foucault, Donzelot, and Deleuze and Guattari as well.

**698 Gadamer's Hermeneutics** Fall, 4 credits  
Open to qualified undergraduates after consultation with the instructor.

R 2:30–4:25. W. W. Holdheim.  
An intensive and systematic study of H. G. Gadamer's work *Truth and Method* (in translation) will lead to an examination of such problems as the structure of humanistic and historical knowledge and its relation to theoretical knowledge, "objectivity" and "subjectivity" in interpretation, the role of language in human existence, and the nature of the aesthetic phenomenon. Various intellectual trends will be located and evaluated in terms of an overall theory of understanding. *Pending approval of the Educational Policy Committee*

**699 The Hermeneutic Tradition** Spring, 4 credits.  
Open to qualified undergraduates after consultation with the instructor.

R 2:30–4:25. W. W. Holdheim.  
Hermeneutics is not so much a particular philosophy among others as an abiding though developing tradition of reflectivity. The course will place this approach into an historical perspective, tracing it back to antiquity (St. Augustine), then following its development from eighteenth-century rationalism via romantic hermeneutics (Schleiermacher, E. A. Poe) and the contribution of the Historical School (Droysen) to *Geisteswissenschaften* (Dilthey). Finally, there will be a discussion of various twentieth-century trends (Bultmann, Ricoeur) and, time permitting, of the relationship of hermeneutics to phenomenology and the critique of ideology.

## Society for the Humanities Seminars of Interest to Comparative Literature Students

**Virgil's Eclogues: Images of Cultural Change (Society for the Humanities 413)** Fall.  
T 3:35–5:20. A. Patterson.

**The Rhetoric of Renaissance Humanism (Society for the Humanities 421–422)** 421, fall; 422, spring.  
M 1:25–3:10. V. Kahn.

**Thinking One's Way Back into the Past (Society for the Humanities 423)** Fall  
T 1:25–3:10. F. Ahl.

**Narcissus at the Well (Society for the Humanities 424)** Spring.  
T 1:25–3:10. F. Ahl.

**The Carolingian Renaissance (Society for the Humanities 425–426)** 425, fall; 426, spring.  
W 1:25–3:10. J. J. John.

**The Rhetoric of Justice (Society for the Humanities 427–428)** 427, fall; 428, spring  
R 1:25–3:10. J. Koffler.

## Related Courses in Other Departments

Many of these courses are conducted in English, and readings are in translation.

### Asian Studies

**Twentieth-Century Chinese Literature (Asian Studies 373)**

**Modern Japanese Fiction (Asian Studies 376)**

### English

**Myth and Heroic Legend (English 219)**

**Saga as Historical Novel (English 318)**

**Four Novelists (English 491)**

## Computer Science

D. Gries, chairman; Ö. Babaoğlu, K. Birman, T. Coleman, R. L. Constable, R. W. Conway, A. J. Demers, J. R. Gilbert, J. Hartmanis, J. E. Hopcroft, G. Johnson, K. Karplus, F. T. Luk, A. Moitra, P. A. Pritchard, G. Salton, F. B. Schneider, D. Skeen, R. Teitelbaum, S. Toueg, C. Van Loan

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 9 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. Students are expected to choose in consultation with their advisers the electives and the 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 321) 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 100–211–280 (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; and
- 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, 314, and 410.
- 3) theory of computation: Computer Science 280, 481, and 482. (One of the following may be substituted for Computer Science 280: Mathematics 332, 381, or 432.)
- 4) numerical analysis: Computer Science 321.

### Related Electives

The related electives requirement consists of three courses. One must be a computer science course numbered above 410; the other two are to be selected from the following:

- Electrical engineering courses numbered 230 or higher.
- Operations research courses numbered 260 or higher.
- Mathematics courses numbered 381 or higher.
- Computer Science courses numbered above 410.

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 Office, 405 Upson Hall. Students may also design their own concentrations, subject to the approval of their adviser. The concentration requirement is waived for students who concurrently major in a related field such as mathematics, linguistics, or psychology.

### 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 insure 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.

### Courses

For complete course descriptions, see the computer science listing in the College of Engineering.

**100 Introduction to Computer Programming** Fall, spring, or summer. 4 credits. Students who plan to take both Computer Science 101 and 100 must take 101 first.

2 lecs; 1 rec (optional). 3 evening exams.

**100 Advanced Placement in Computing** Fall. 2 credits plus 2 advanced placement credits. S-U grades only. To take this course, students enroll in Computer Science 100 or Engineering 105 for 2 credits.

2 lecs. 2 evening exams.

**101 The Computer Age** Fall, spring, 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.

**211 Computers and Programming** Fall, spring, or summer. 3 credits. Prerequisite: Computer Science 100 or equivalent programming experience.

2 lecs, 1 rec. 2 evening exams.

**280 Discrete Structures** Fall or spring. 4 credits. Prerequisite: Computer Science 211 or permission of instructor.

3 lecs.

**305 Social Issues In Computing** Fall. 3 credits.  
Prerequisites: Computer Science 100 or 101 or permission of instructor.  
2 lecs.

**314 Introduction to Computer Systems and Organization** Spring or summer. 4 credits.  
Prerequisite: Computer Science 211 or equivalent.  
2 lecs; 1 rec. 2 evening exams.

**321 Numerical Methods** Fall or spring. 4 credits.  
Prerequisites: Computer Science 100 and Mathematics 221 or coregistration in Mathematics 294.  
3 lecs.

**410 Data Structures** Fall or summer. 4 credits.  
Prerequisite: Computer Science 280 or permission of instructor.  
3 lecs. 2 evening exams.

**411 Programming Languages and Logics** Spring. 4 credits. Enrollment limited. Prerequisites: Computer Science 410 and permission of instructor.  
2 lecs.

**414 Systems Programming and Operating Systems** Fall. 3 credits. Prerequisite: Computer Science 314 or permission of instructor.  
2 lecs. 2 evening exams.

**415 Practicum In Operating Systems** Fall. 2 credits. Corequisite: Computer Science 414.  
1 lec.

**417 Interactive Computer Graphics (also Architecture 334)** Spring. 4 credits. Enrollment limited for 1983–84. Prerequisite: Computer Science 314.  
2 lecs, 1 lab.

**432 Introduction to Database Systems** Spring. 4 credits. Prerequisite: Computer Science 211 or permission of instructor.  
2 lecs, 1 rec.

**481 Introduction to Theory of Computing** Fall. 4 credits. Prerequisites: Computer Science 280 or permission of instructor.  
3 lecs.

**482 Introduction to Analysis of Algorithms** Spring. 4 credits. Prerequisites: Computer Science 410 and 481 or permission of instructor.  
3 lecs.

**[484 Introduction to Symbolic Computation]** Spring. 4 credits. Prerequisites: Computer Science 481 or Mathematics 332 or 432 or permission of instructor. Not offered 1983–84.  
2 lecs.]

**490 Independent Reading and Research** Fall or spring. 1–4 credits.

**600 Computer Science and Programming** Fall. 1 credit. Prerequisite: graduate standing in computer science or permission of instructor.  
1 lec.

**611 Advanced Programming Languages** Fall. 4 credits. Prerequisite: Computer Science 410 or permission of instructor.  
3 lecs.

**612 Translator Writing** Spring. 4 credits.  
Prerequisites: Computer Science 410 and 481 or permission of instructor.  
3 lecs.

**613 Concurrent Programming and Operating Systems Principles** Spring. 4 credits.  
Prerequisites: Computer Science 414 and 600 or permission of instructor.  
3 lecs.

**614 Advanced Operating Systems** Spring. 4 credits. Prerequisite: Computer Science 414 or permission of instructor.  
2 lecs.

**[615 Machine Organization]** Spring. 4 credits.  
Prerequisite: Computer Science 314 or permission of instructor. Not offered 1983–84.]

**621–622 Numerical Analysis** 621, fall; 622, spring. 4 credits each term. Prerequisites: Computer Science 321 and Mathematics 411 and 431 or permission of instructor.  
3 lecs.

**632 Database Systems** Fall. 4 credits.  
Prerequisites: Computer Science 410 and either Computer Science 432 or permission of instructor.  
2 lecs.

**635 Information Organization and Retrieval** Spring. 4 credits. Prerequisite: Computer Science 410 or equivalent or permission of instructor.  
2 lecs.

**632 Database Systems** Fall. 4 credits.  
Prerequisites: Computer Science 410 and either Computer Science 432 or permission of instructor.  
2 lecs.

**643 Design and Analysis of Computer Networks** Fall. 4 credits. Prerequisite: Computer Science 414 or permission of instructor. Not offered every year.  
2 lecs.

**652 Sparse Matrix Theory: Combinatorial Algorithms and Numerical Computation** Spring. 4 credits. Prerequisites: Computer Science 621 and 681 or permission of instructor. Not offered every year.  
2 lecs.

**681 Analysis of Algorithms** Fall. 4 credits.  
Prerequisites: Computer Science 481 or permission of instructor.  
3 lecs.

**682 Theory of Computing** Spring. 4 credits.  
Prerequisite: Computer Science 481 or permission of instructor.  
3 lecs.

**709 Computer Science Graduate Seminar** Fall or spring. 1 credit. S-U grades only. For staff, visitors, and graduate students interested in computer science.

**711 Topics In Programming Languages and Systems** Spring. 4 credits. Prerequisites: Computer Science 481 and 611 or permission of instructor. Not offered every year.  
2 lecs.

**712 Topics In Programming Languages and Systems** Spring. 4 credits. Prerequisite: Computer Science 612. Not offered every year.  
2 lecs.

**713 Seminar In Operating Systems** Fall or spring. 4 credits. Prerequisite: Computer Science 613 or permission of instructor.

**715 Seminar In Programming Refinement Logics** Fall or spring. 4 credits. Prerequisite: permission of instructor.

**719 Seminar In Programming** Fall or spring. 4 credits. Prerequisite: Computer Science 611 or permission of instructor. S-U grades only.

**721 Topics In Numerical Analysis** Fall. 4 credits.  
Prerequisite: Computer Science 621 or 622 or permission of instructor. Not offered every year.  
2 lecs.

**722 Topics In Numerical Analysis** Spring. 4 credits. Not offered every year.  
2 lecs.

**729 Seminar In Numerical Analysis** Fall or spring. 4 credits. Prerequisite: permission of instructor. S-U grades only.

**[733 Selected Topics In Information Processing]** Not offered 1983–84.]  
2 lecs.

**[734 Seminar In File Processing]** Fall. Credit to be arranged. Prerequisite: Computer Science 733 or permission of instructor. Not offered 1983–84.]

**739 Seminar In Information Organization and Retrieval** Fall or spring. Credit to be arranged. Prerequisite: Computer Science 635 or permission of instructor. S-U grades only.

**747 Seminar In Semantics** Spring. 1 credit.  
Prerequisite: permission of instructor. S-U grades only.

**749 Seminar In Systems Modeling and Analysis** Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.

**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.

**782 Topics In Analysis of Algorithms and Theory of Computing** Spring. 4 credits. S-U grades only. Prerequisites: Computer Science 681 and 682 or permission of instructor. Not offered every year.  
2 lecs.

**789 Seminar In Theory of Algorithms and Computing** Fall or spring. 2–4 credits. Prerequisite: permission of instructor. S-U grades only.

**790 Special Investigations In Computer Science** Fall or spring. Prerequisite: permission of a computer science adviser.

**890 Special Investigations In Computer Science** Fall or spring. Prerequisite: permission of a computer science adviser. S-U grades only.

**990 Special Investigations In Computer Science** Fall or spring. Prerequisite: permission of a computer science adviser. S-U grades only.

## Dutch

See Modern Languages, Literatures, and Linguistics, p. 153.

## Economics

M. Majumdar, chairman; R. Masson, field representative; N. Kiefer, director of undergraduate studies; K. Burdett, R. Chirinko, T. E. Davis, D. Easley, L. Ebrill, R. Ehrenberg, G. Fields, R. H. Frank, E. Grinols, G. Hay, W. Isard, A. E. Kahn, P. D. McClelland, T. Mitra, L. Muus, U. M. Possen, R. E. Schuler, G. J. Staller, J. Svejnar, E. Thorbecke, S. C. Tsiang, I. Tunali, J. Vanek, H. Y. Wan, Jr., M. Yano

The study of economics provides an understanding of the way economies operate and 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.

## The Major

Students who wish to major in economics must have completed Economics 101–102 or equivalent courses and Mathematics 111 or its equivalent with grades of C or better. Prospective majors should apply at the department office. Students considering a major in economics should take Economics 313 and 314 instead of Economics 311 and 312.

The requirements for a major are (1) Economics 319, 313, and 314 or (with the adviser's approval) 311 and 312; and (2) 20 credits of other economics courses listed by the Department of Economics, except that Economics 399 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. Also with the major adviser's permission, a statistics course offered by another department may be substituted for Economics 319.

An honors program will be offered in the 1983–84 academic year. Students should consult the director of undergraduate studies for more information.

Students planning graduate work in economics or business are strongly encouraged to prepare themselves well in mathematics and econometrics.

## Courses

**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.

**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.

**301 Economics of Market Failure** Fall. 4 credits. Prerequisite: Economics 101 and 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 redistributive objectives; (f) direct and indirect taxation as instruments of redistribution.

**[302 The Impact and Control of Technological Change (also Government 302 and City and Regional Planning 440)]** Spring. 4 credits. Not offered 1983–84.

Examines social, environmental, and economic implications of technological change in the United States in the context of possible policies and strategies of control. Several specific cases will be considered in detail, followed by a broader investigation of the problems of a modern technological society. Alternative political-economic solutions will be explored.]

**304 Economics and the Law** Spring. 4 credits. Prerequisite: Economics 311 or 313 or permission of instructor.

An examination, through the lens of economic analysis, of legal principles drawn from a variety of legal fields, including contracts, property, torts, and procedure. No legal training is required.

**[306 Economics of Defense Spending]** Spring. 4 credits. Prerequisite: Economics 101 and 102. Not offered 1983–84.

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.]

**307 Introduction to Peace Science** Fall. 4 credits. Prerequisite: Economics 101–102 or permission of instructor.

Introduction to theories and research on conflict resolution. Topics include conflict, its role and impact upon society; theories of aggression and altruism; causes of war; game theory; conflict management procedure and other analytical tools and methods of peace science; alternatives to war.

**308 Economic Analysis of Government (also Civil and Environmental Engineering 322)]** Spring. 4 credits. Prerequisites: one year of college-level mathematics plus Civil and Environmental Engineering 321 or Economics 311 or 313.

Government intervention in a market economy is analyzed. Public goods, public finance, cost-benefit analysis, environment regulation, and macroeconomic topics are covered.

**[309 Capitalism and Socialism (also Industrial and Labor Relations 347)]** Fall. 4 credits.

Prerequisite: permission of instructor. Not offered 1983–84.]

**311 Intermediate Microeconomic Theory** Fall, spring, or summer. 4 credits. Prerequisites:

Economics 101–102 or permission of instructor. The pricing processes 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.

**312 Intermediate Macroeconomic Theory** Fall, spring, or summer. 4 credits. Prerequisites:

Economics 101–102 or permission of instructor. The theory of national income 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.

**313 Intermediate Microeconomic Theory** Fall or spring. 4 credits. Prerequisites: Economics 101–102 and calculus.

See Economics 311 for course description.

**314 Intermediate Macroeconomic Theory** Fall or spring. 4 credits. Prerequisite: Economics 101–102 and calculus.

For description see Economics 312.

**315 History of Economic Thought** Fall. 4 credits. Prerequisites: Economics 101–102 or permission of instructor.

Selected readings from the works of Adam Smith, T. Malthus, D. Ricardo, J. S. Mill, L. Walrus, J. A. Schumpeter, A. Marshall, and J. M. Keynes.

**317 Intermediate Mathematical Economics I** Fall. 4 credits.

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.

**318 Intermediate Mathematical Economics II** Spring. 4 credits.

Advanced techniques of optimization and application to economic theory.

**319 Quantitative Methods** Fall. 4 credits.

Prerequisites: Economics 101–102 and calculus (Mathematics 111 or equivalent).

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 testing (of sample means, proportions, variance). Regression analysis and correlation are introduced.

**320 Quantitative Methods** Spring. 4 credits

Prerequisites: Economics 101–102, 319, or approved equivalent, and calculus (Mathematics 111 or equivalent). Intermediate micro and macro theory are recommended but not required.

This course provides an introduction to the theory and application of econometric techniques. Students will learn how econometric models are formulated, estimated, used to test hypotheses, and used to forecast, will gain some ability in carrying out these operations, and will gain some facility in understanding economists' results in studies using applied economics. The course covers the linear regression model and the multiple regression model (including dummy variables, autocorrelation, multicollinearity, heteroscedasticity, and distributed lag models), and introduces simultaneous equation models.

**323 American Economic History** Fall. 4 credits. Problems in American economic history from the first settlements to early industrialization are surveyed.

**324 American Economic History** Fall. 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.

**325 Economic History of Latin America** Fall. 4 credits. Open to upperclass students with some background in economics or history, or with permission of instructor.

**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.

**329 Eastern Europe Today: Economics, Government, Culture (also Government 326 and Russian 329)]** Spring. 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. The goals of the course are to examine differences (the variety of backgrounds) among East European countries, the common elements (for example, political relations with the USSR), domestic situations, the economy, and culture.

**330 The Soviet Union: Politics, Economics, and Culture (also Government 330 and Russian 330)]** Fall. 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.



**331 Money and Credit** Fall, 4 credits

Prerequisites: Economics 101–102.

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.

**333 Theory and Practice of Asset Markets** Fall, 4 credits. Prerequisites: Economics 311–313 and 312 or 314

The theory and decision making in the presence of uncertainty and the practical aspects of particular asset markets are examined.

**335 Public Finance: Resource Allocation and Fiscal Policy** Fall, 4 credits. Prerequisites: Economics 101–102.

The role of government in a free market economy is analyzed. Topics covered include the federal debt, taxes, the budget, and government regulation. Current topics of an applied nature will vary from term to term.

**336 Public Finance: Resource Allocation and Fiscal Policy** Spring, 4 credits. Prerequisites: Economics 101–102, one semester of calculus, or permission of instructor.

A continuation of Public Finance, Economics 335, covering noninstitutional topics. Subjects covered include cost-benefit analysis, choice of public discount rate, optimal commodity taxation, local public good, collective choice, and other topics depending on the interests of the instructor and the class.

**338 Macroeconomic Policy** Fall, 4 credits.

Prerequisite: Economics 312 or 314.

The use of fiscal and monetary policies for achieving full employment, price-level stability, and appropriate economic growth are studied.

**[341 Labor Economics** Fall, 4 credits.

Prerequisites: Economics 101–102. Not offered 1983–84.]

**[342 Problems In Labor Economics (also Industrial and Labor Relations 343)** Fall, 4 credits

Prerequisites: Economics 311 or 313 or Industrial and Labor Relations 240. Not offered 1983–84.

The theory and empirical analysis of labor markets and their applications to policy issues are considered in depth. Specific topics vary each semester. The course is designed to increase each student's competence in applying microeconomic theory and econometrics to policy issues through an econometric research project.]

**351 Industrial Organization** Fall, 4 credits.

Prerequisites: Economics 311 or 313 or permission of instructor.

An examination of the ways in which markets in a modern industrial economy differ from the atomistically competitive model, the consequences of those deviations, and (if appropriate) the cures for them. The course covers the economic theories of monopoly and oligopoly, including issues involving mergers and vertical integration, and analyzes efforts of the United States, primarily through its antitrust laws, to deal with perceived shortcomings in the behavior of the American economy.

**352 Advanced Topics in Industrial Organization**

Spring, 4 credits. Prerequisites: Economics 311, 351, and some knowledge of calculus.

This course examines some of the major issues raised in the industrial organization literature. Major topics include market structure; information and advertising; pricing and entry; regulation; research and development and technological progress; integration; and antitrust policy. Typically, about half of these topics would be covered in any individual year. The course will blend empirical and institutional analysis, with a heavy emphasis on theoretical modeling.

**354 Economics of Regulation** Spring, 4 credits

A study of the economics of direct regulation of industry. Concentration will be on the application of economic principles to common problems of regulation, with equal emphasis on institutional problems—the characteristics and problems of the regulatory process itself, the proper role and definition of competition—and recognition throughout of the necessity for reconciling economic and noneconomic goals

**355 Economics of the American System of Private Enterprise** Fall, 4 credits. Prerequisites: Economics 311 or 313 and 312 or 314, or equivalents.

A critical examination of the private sector of the United States economy: its history, some leading current issues involving it, and its relation to theoretical and philosophical interpretations of the market economy.

**356 Economics of the American System of Private Enterprise** Spring, 4 credits. Prerequisites: Economics 311 or 313 and 312 or 314 or equivalents.

For description see Economics 355.

**357 Economics of Imperfect Information** Fall, 4 credits. Prerequisites: Economics 101–102 and calculus.

This course covers a variety of topics in the economics of uncertainty, including basic decision theory, search theory, risk insurance, and equilibrium price dispersion.

**[358 Current Economic Issues** Fall, 3 or 4 credits.

Prerequisites: Economics 101–102. (A research paper will be required if the 4-credit option is chosen.) Not offered 1983–84.

The emphasis will be on the application of simple microeconomics and industrial organization concepts to the formulation of public policy in the present and recent past. Among the topics likely to be covered will be policies relating to energy, communications, transportation; the financing and delivery of medical care, public utility, and other kinds of regulation; and the economics of inflation.]

**361 International Trade Theory and Policy** Fall, 4 credits. Prerequisites: Economics 101–102 or permission of instructor.

The principles that have guided the formulation of international trade and commercial policies are surveyed. The evolution of the theory of international trade, principles and practices of commercial policy, problems of regional integration and customs unions, and institutions and practices of state trading are considered.

**362 International Monetary Theory and Policy**

Spring, 4 credits. Prerequisites: Economics 101–102 or permission of instructor.

The principles that guided the formulation of international financial policies are surveyed. The evolution of the theory of balance of payments adjustment, international monetary standards, international capital movements, economic aid, international monetary institutions, and proposals for international monetary reforms are considered.

**366 The Economy of the Soviet Union** Fall, 4 credits. Prerequisites: Economics 101–102.

A survey of the Soviet economic system and Soviet economic development since 1977. Both institutional and theoretical aspects will be considered. Emphasis will be on current developments, including East-West economic and military competition, economic relations with the Eastern Bloc and with Western Europe, and foreign trade.

**367 Comparative Economic Systems: Soviet Union and Europe** Fall, 4 credits. Prerequisite: Economics 311–312 or permission of instructor.

Discussion of approaches to comparison of economic systems. Consideration of abstract models (market economy, central planning, decentralized

socialist market) as well as national economies (France and Sweden, Yugoslavia and Soviet Union). Possibility of convergence of economic systems is explored.

**368 Comparative Economics: United States, Europe, and the Soviet Union** Spring, 4 credits

Prerequisites: Economics 101–102. Intended for students who are not majoring in economics. European and Soviet economies after the Second World War are surveyed. The European countries studied include France, Sweden, and Italy in the West, and Yugoslavia plus another country in the East. A descriptive and institutional approach is used and designed for nonmajors.

**[369 Selected Topics in Socialist Economics** Fall, 4 credits. Prerequisite: Economics 101–102.

Not offered 1983–84.

Selected topics on the contemporary economic situation in the Soviet Union and Eastern European countries. Evolution of East-West economic relations. Special emphasis on Poland and the implications of its current crisis. The application of formal economic models to the analysis of these countries' economic problems (economic growth, business cycles, inflation, technology factor, etc.).]

**371 Economic Development** Fall, 4 credits

Prerequisites: Economics 313 or 311 and calculus, and Economics 320.

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.

**[372 Applied Economic Development** Spring, 4 credits. Not offered 1983–84.]**[373 International Specialization and Economic Development** Spring, 4 credits. Prerequisites: Economics 101–102 or permission of instructor.

Not offered 1983–84.

The assessment of the gains and risks and the appropriate role for specialization and trade in economic development, management of the external disequilibrium attending serious efforts to accelerate economic development; and the processes, institution, and opportunities for innovation in transferring income from the relatively developed countries to those less developed.]

**374 National and International Food Economics (also Nutritional Sciences 457)** Spring, 3 credits

Prerequisites: a college course in economics and junior standing or permission of instructor.

Examination of individual components essential for an understanding of the United States 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.

**378 Economics, Population, and Development** Fall, 4 credits.

The economic aspects of population and the interaction between population change and economic change are introduced. Particular attention is paid to economic views of fertility, mortality, and migration, and to the impact of population growth on economic growth, development, modernization, resources, and the environment.

**381 Economics of Participation and Workers' Management** Fall. 4 credits. Prerequisites: Economics 311 or 313 and 312 or 314.

Alter a historical survey of the ideas and practices of self-management and worker's cooperation, the main economic issues relating to the participatory firms and economies will be studied. Special attention will be given to the outcome of the decision-making process at the level of the enterprise, the consistency of these outcomes with national plans, and the policies used to implement them. Examples will be drawn from the Yugoslav experience and, depending on student interest, the discussion will cover other foreign experiences such as Algeria, the Basque region, Chile, West Germany, Israel, Peru, and others. A considerable emphasis will be given to the new developments and new possibilities of implementing democratic, worker-owned and worker-managed enterprises in the United States. Drawing on theoretical analysis developed in the course, appropriate institutions and legal forms of self-management in the United States will be examined.

**382 The Practice and Implementation of Self-Management** Fall. 4 credits. Prerequisite:

Economics 311 or 313 and 312 or 314 or permission of instructor. The various forms of labor participation in the world today are described, and how producer cooperatives and labor-managed firms and systems can be created is explained. Extensive use is made of the theory of labor-managed systems. The history of various doctrines and self-managed experience is considered.

**399 Readings in Economics** Fall or spring. Variable credit. Independent study.**[416 Intertemporal Economics** Fall 4 credits. Prerequisites: Economics 313 or 311 and calculus. Not offered 1983-84.

This course is intended for advanced economics majors who are specially 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.]

**445 Topics in Microeconomic Analysis—Markets and Planning** Fall. 4 credits. Prerequisites:

Economics 313 or 311 and one term of calculus. This is a course of economic theory designed for upperclass undergraduates. Course contents may vary from year to year. Issues that may be examined here 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? etc. 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.

**466 Topics in Macroeconomic Analysis—Is Keynesianism Dead?** Spring. 4 credits.

Prerequisites: Economics 314 or 312 and one term of calculus. 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.

**481 Economic Effects of Participation and Labor-managed Systems** Spring. 4 credits. Prerequisites: Economics 313 or 311 and calculus, Economics 320 and 381.

The course applies microeconomic theory to analyze the performance of firms in which employees either participate in the decision-making process or make all the important decisions. Numerous empirical studies are examined with particular emphasis on their ability to model the relevant institutions and test the resulting theoretical predictions with appropriate econometric methods.

**482 Practical Aspects of Business Management of Worker Enterprises** Spring. 4 credits.

Prerequisites: Economics 311 or 313 and 312 or 314. May be taken concurrently with or following Economics 382/582.

This course is designed to further and deepen undergraduate and graduate students' knowledge of workers' self-management and cooperation, especially in view of actual formation of democratic enterprises. It will be based primarily on Freirean 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, together with occasional invited speakers practically involved in the area of workers' management and cooperation. Students who have taken all three courses, Economics 382/582, 482, and 483, both graduate and undergraduate, are welcome to participate as teacher-student interns. They may receive additional independent study credits for this work.

**483 The Technological and Product Base of Worker Enterprises, with Special Emphasis on Ecology and Solar Energy Applications** Spring 4 credits. Prerequisites: Economics 311 or 313 and 312 or 314. May be taken concurrently with or following Economics 382/582 and 482.

This course is designed to further and deepen undergraduate and graduate students' knowledge of workers' self-management and cooperation, especially in view of actual formation of democratic enterprises. Students who have taken all three courses, Economics 382/582, 482, and 483, both graduate and undergraduate, are welcome to participate as teacher-student interns. They may receive additional independent study credits for this work. We will discuss the relationships between technology and choice of products on the one hand and socioeconomic systems on the other, while also engaging in actual learning about, and production of, solar-energy-based new technologies and products. Each student will be able to construct his or her own solar water pump using the Vanek patents pending and work on several other related concrete projects. The students will also be invited to form worker cooperatives based on the experiences and results of Economics 382/582, 482, and 483.

**Graduate Courses and Seminars****503 Nonparametric Methods for Peace Scientists and Regional Scientists** Fall. 4 credits.

Topics to be covered include advantages and disadvantages of parametric and nonparametric methods; problems involved in measurement; nonparametric methods based on one sample and many samples; nonparametric methods requiring only nominal measurement, and those requiring only ordinal measurement; nonparametric measures of association; procedures for nonnormal distributions.

**504 Economics and the Law** Spring. 4 credits. For description see Economics 304.**505 Interdependent Decision Making** Fall 4 credits.

The basic elements in interdependent decision-making situations are examined. Situations where decision makers have different sets of objectives that they wish to achieve and employ different criteria for evaluating performance are focused on. The use of maximizing incremental procedures, game theory, and diverse methods of establishing priorities and cooperative action as well as recursive, interactive approaches to resolve conflict are considered. Coalition theory and related topics are covered.

**509 Microeconomic Theory I** Fall. 4 credits. Topics in consumer and producer theory.**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.**513 Macroeconomic Theory: Static Income Determination** Fall. 4 credits.**514 Macroeconomic Theory: Dynamic Models, Growth, and Inflation** Spring. 4 credits.**517 Intermediate Mathematical Economics I** Fall 4 credits.**518 Intermediate Mathematical Economics II** Spring. 4 credits.**519 Quantitative Methods** Spring. 4 credits.**520 Quantitative Methods** Fall. 4 credits.

Prerequisites: good control of microeconomic and macroeconomic theory and some knowledge of calculus, linear algebra, and probability; or permission of instructor.

The application of quantitative analysis to testing of economic theories provides a framework for study and evaluation of cross-section and time-series data, methodology and theory of economic measurement, statistical techniques, empirical studies, and economic forecasting.

**523 American Economic History** Fall 4 credits. For description see Economics 323.**524 American Economic History** Spring. 4 credits. For description see Economics 324.**525 Economic History of Latin America** Fall 4 credits. For description see Economics 325.**535 Public Finance: Resource Allocation and Fiscal Policy** Fall 4 credits. For description see Economics 335.**536 Public Finance: Resource Allocation and Fiscal Policy** Spring. 4 credits. For description see Economics 336.**551 Industrial Organization** Fall. 4 credits. For description see Economics 351.**552 Public Regulation of Business** Spring. 4 credits. For description see Economics 352.**555 Economics of the American System of Private Enterprise** Fall. 4 credits. For description see Economics 355.**556 Economics of the American System of Private Enterprise** Spring. 4 credits. For description see Economics 356.**557 Economics of Imperfect Information** Fall. 4 credits. Prerequisites: Economics 509 and statistics.

The purpose of the 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 search theory will be discussed.

**561 International Trade Theory and Policy** Fall 4 credits.  
For description see Economics 361.

**562 International Monetary Theory and Policy** Spring. 4 credits.  
For description see Economics 361.

**565 Economic Problems of Latin America** Spring. 4 credits.

**567 Comparative Economic Systems: Soviet Union and Europe** Fall 4 credits.  
For description see Economics 367.

**571 Economic Development** Spring 4 credits  
For description see Economics 371.

**572 Applied Economic Development** Spring 4 credits.  
For description see Economics 372.

**573 International Specialization and Economic Development** Spring. 4 credits.  
For description see Economics 373.

**578 Economics, Population, and Development** Fall. 4 credits.  
For description see Economics 378.

**581 Economics of Participation and Worker Management** Fall. 4 credits.  
For description see Economics 381.

**582 The Practice and Implementation of Self-Management** Fall. 4 credits.  
For description see Economics 382.

**599 Readings in Economics** Fall or spring.  
Variable credit. Independent study

**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.

**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.

**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.

**611 Advanced Microeconomic Theory** Fall 4 credits.

**612 Advanced Macroeconomic Theory** Fall. 4 credits.

**617 Mathematical Economics** Fall. 4 credits.

**618 Mathematical Economics** Spring 4 credits

**619 Econometrics** Fall. 4 credits. Prerequisites: calculus and linear algebra. Recommended: Economics 520 or equivalent.  
Detailed examination of regression models at the level of H. Theil, *Principles of Econometrics*. Emphasis is on theoretical aspects rather than practical applications. Topics include distribution theory and the use of sufficient statistics, the classical regression model, generalized least squares, modified generalized least squares, and the multivariate regression model.

**620 Econometrics** Spring. 4 credits. Prerequisites: calculus and linear algebra plus Economics 619 or permission of instructor. Recommended: Economics 520 or equivalent.  
Advanced topics in econometrics, such as asymptotic distribution theory, errors in variable and latent variable models (e.g. factor analysis), simultaneous equation models with particular attention to problems of identification, time series analysis, qualitative response models, and aggregation.

**[623 American Economic History** Fall 4 credits  
Not offered 1983-84.]

**[624 American Economic History** Spring. 4 credits. Not offered 1983-84.]

**[626 Methods in Economic History** Spring 4 credits. Not offered 1983-84.]

**631 Monetary Theory and Policy** Fall. 4 credits.

**632 Monetary Theory and Policy** Spring 4 credits.

**635 Public Finance: Resource Allocation and Fiscal Policy** Fall. 4 credits.

**636 Public Finance: Resource Allocation and Fiscal Policy** Spring 4 credits.

**[638 Public Finance: Local Government and Urban Structure** Fall. 4 credits. Not offered 1983-84.]

**641 Seminar in Labor Economics** Fall 4 credits

**642 Seminar in Labor Economics** Spring. 4 credits.

**[644 The Labor Market and Public Policy: A Comparative View** Spring. 4 credits. Not offered 1983-84.]

**647 Economics of Evaluation (also Industrial and Labor Relations 647)** Spring. 4 credits.  
For description see Industrial and Labor Relations 647.

**[648 Issues in Latin America** Spring 4 credits.  
Not offered 1983-84.]

**651 Industrial Organization and Regulation** Fall 4 credits.

**652 Industrial Organization and Regulation** Spring. 4 credits.

**661 International Economics: Pure Theory and Policy** Fall. 4 credits.

**662 Seminar in International Economics** Spring. 4 credits. Prerequisites: Economics 661.  
acquaintance with conventional trade analysis, or permission of instructor.

The course will cover advanced topics in international economics normally covered in International Economics 661.

**664 International Economics: Balance of Payments and International Finance** Spring. 4 credits.

**[670 Economic Demography and Development** Fall. 4 credits. Not offered 1983-84.]

**671 Economics of Development** Spring. 4 credits.

**672 Economics of Development** Fall 4 credits.

**[673 Economic Development** Spring. 4 credits. Prerequisites: Economics 509, 520. Not offered 1983-84.  
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.]

**[674 Economic Systems** Spring. 4 credits. Not offered 1983-84.]

**[678 Economic Growth in Southeast Asia** Spring. 4 credits. Not offered 1983-84.]

**[679 Theory of Quantitative Economic Policy** Spring. 4 credits. Not offered 1983-84.]

**681 Economics of Participation and Self-Management** Fall. 4 credits.  
The theory of labor-management economies is developed systematically, and literature on that and related subjects is 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.

**682 Seminar on Economics of Participation and Labor-managed Systems** Fall. 4 credits.

**684 Seminars in Advanced Economics** Fall or spring. 4 credits.

## English

A. R. Parker, chairman; T. D. Hill, director of undergraduate studies, fall (323 Goldwin Smith Hall, 256-3335); R. Morgan, director of undergraduate studies, spring (363 Goldwin Smith Hall, 256-5184); B. B. Adams, A. R. Ammons, J. P. Bishop, J. F. Blackall, F. V. Bogel, L. Brown, A. Caputi, C. Chase, M. J. Colacurcio, J. Culler, D. D. Eddy, S. B. Elledge, R. T. Farrell, E. G. Fogel, D. Fried, L. Green, J. Harris, L. Herrin, M. Hite, M. Jacobus, P. Janowitz, C. V. Kaske, R. E. Kaske, R. Kirschten, C. S. Levy, A. Lurie, D. E. McCall, K. A. McClane, J. R. McConkey, H. S. McMillin, P. L. Marcus, D. M. Mermin, S. P. Mohanty, T. C. Murray, D. Novarr, S. M. Parrish, M. A. Radzinowicz, E. Rosenberg, P. L. Swayer, D. R. Schwarz, M. Seltzer, H. E. Shaw, S. Siegel, W. J. Slatoff, J. Stallworthy, S. C. Strout, G. Teskey. Visiting professors and postdoctoral fellows: K. Hathaway, L. Patterson, S. Vaughn, J. Visconti

The Department of English offers a wide range of courses in English and American literature as well as in creative writing and expository prose. Literature courses focus variously on close reading of texts, on study of particular authors and genres, on the relationship of literary works to their historical periods, and on questions of critical theory and method. The department not only stresses the development of

analytical reading and lucid writing but, through the study of major literary texts, teaches students to think about the nature and value of human experience.

Students who major in English develop their own programs of study in consultation with their advisers. Some focus on a particular historical period, or develop programs that concentrate on poetry, drama, or the novel. Others have a special interest in creative writing. Students may also concentrate in medieval studies or American studies.

## The Major

Any student considering a major in English should see the department's director of undergraduate studies to arrange an assignment to a major adviser. Copies of a brochure containing suggestions for English majors and prospective English majors are available in the department office, 252 Goldwin Smith Hall. Prospective English majors should take one or more courses from among English 270, 271, 272, 275, 280, and 281 as early as possible. All of these courses are open to sophomores and to qualified freshmen. As soon as students have completed one of these courses they may declare themselves English majors, provided they have achieved an average of C or better in the English courses they have taken. English 270, 271, 272, open to all second-term freshmen, may be used to satisfy the Freshman Seminar requirement. First-term freshmen who have received advanced placement credit in English may enroll in English 270, 271, or 272 as space permits, and students interested in majoring in English are encouraged to do so.

Students majoring in English are required to complete 6 credits of foreign language study (preferably in the literature of a foreign language) in courses for which qualification is a prerequisite. Majors are urged to complete this requirement by the end of their sophomore year, and students who enter Cornell without sufficient preparation should therefore begin studying a language during their freshman year.

In addition to satisfying the requirements outlined above, English majors must take a minimum of 36 credits in courses approved for the major and complete them with passing letter grades. Courses approved for the major are English 201 and 202 and all English courses numbered 300 or above except English 496. In addition to 201–202, students may count up to two courses for the major from the category entitled "200-Level Courses Approved for the Major." Students may also offer in satisfaction of the major as many as three courses numbered 300 or above in a foreign literature, in comparative literature, or in special courses such as those sponsored by the Society for the Humanities, provided these alternatives are approved by their adviser.

Among the courses approved for the major, English 201 and 202 are especially recommended for English majors and should be taken by the end of the sophomore year. Students who do not take English 201–202 should choose their major courses with a view toward covering the historical range of English and American literature. Literature courses at the 300 level are intended to provide such coverage. Of the 36 credits required for the major, at least 8 must be in English or American literature written before 1800.

**Honors.** Prospective candidates for the degree of Bachelor of Arts with honors in English should consult the chairperson of the Honors Committee during the spring term of their sophomore year or early in their junior year. Honors candidates will take one or two honors seminars (English 491 or 492) during their junior year, as well as a 400-level course in the field in which they plan to work during their senior year. The work of the senior year is a year-long tutorial (English 493 and 494) on a special topic of the candidate's choosing, culminating in the writing of a scholarly honors thesis of approximately fifty pages, or a book-length work of high quality in creative writing completed for English 480–481. 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 and 600 levels for nonmajors will vary from topic to topic, and permission of the instructor is required.

## Courses for Freshmen

As part of the Freshman Seminar 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 Seminar offerings may be found on pages 205–206.

## Courses for Sophomores

Although courses numbered in the 200s are primarily for sophomores, some of them are open to qualified freshmen and to upperclass students. Courses approved for the major are English 201 and 202 and all courses numbered 300 or above except English 496. In addition to English 201–202, students may count up to two 200-level courses toward the major from "Courses Approved for the Major," listed below.

**201–202 The English Literary Tradition** 201, fall; 202, spring. 4 credits each term. Open to all undergraduates. English 201 is not a prerequisite to 202. May be counted toward the English major.

M W F 11:15. Fall: G. Teskey. Spring: J. Stallworthy. Interpretation of major works ranging from *Beowulf* through Yeats. English 201 surveys Old English poetry, Chaucer, medieval romances, Spenser, Shakespeare, Donne, and Milton. English 202 includes Dryden, Swift, Pope, Samuel Johnson, Blake, Jane Austen, the major Romantic and Victorian poets, Shaw, and Yeats. The course will be conducted by a combination of lectures and intensive seminars in special topics.

## Courses Primarily for Nonmajors

**205–206 Readings in English and American Literature** 205, fall; 206, spring. 3 credits each term. Open to all undergraduates. English 205 is not a prerequisite to 206.

M W F 10:10. Fall: R. T. Farrell. Spring: S. M. Parrish.

205: An introduction to some of the major works of English and American literature from the sixteenth to the nineteenth century. Plays, poems, and novels will be covered with particular emphasis on the Renaissance, the eighteenth century, and three American writers of the nineteenth century. Readings will be from such writers as Shakespeare, Jonson, Marlowe, Donne, Pope, Swift, Johnson, Cooper, Melville, and James.

206: Covers literature since the mid-nineteenth century: novels by such authors as Emily Brontë, Twain, Conrad, Lawrence, James, Hardy, Hemingway, and Faulkner; perhaps a play by Shaw or Pinter; and poems by Yeats, Auden, Frost, or others. Two lectures and a small discussion section each week. One short paper, a prelim, and a final examination.

**219 Myth and Heroic Legend** Spring. 3 credits. M W F 12:20. J. Harris.

A survey of myth and heroic legend in the early and oral literatures of Europe. Texts to be considered may include *Gilgamesh*, the Greek *Homeric Hymns*, *Beowulf*, the Old Norse-Icelandic Poetic and Prose *Eddas*, the Finnish *Kalevala*, the Welsh *Mabinogion*,

the Old High German *Hildebrandslied*, the Old Irish *Tain*, the *Nibelungenlied*, *Gisla saga* or *Laxdaela saga*, Ibsen's *The Vikings at Helgoland*, and Wagner's *The Ring of the Nibelung*. All texts will be read in translation; there are no prerequisites.

**227 Shakespeare** Fall or spring. 3 credits. Each section limited to 25 students.

M W F 10:10, 11:15, 1:25, or T R 12:20–1:35 or 2:30–3:45. Staff.

A critical study of representative plays from the principal periods of Shakespeare's career.

**288–289 Expository Writing** 288, fall; 289, spring. 3 credits each term. Each section limited to 18 students.

M W 9:05 or 10:10 or 2:30, or T R 11:15 or 2:30, plus conferences to be arranged. N. Kaplan and others.

This course is intended to meet the needs of undergraduates from a range of disciplines who wish to gain skill in expository writing. Under the instructor's direction, students will write on topics related to their own interests. A substantial amount of new writing or a revision of an earlier essay will be expected each week. Since the class is the primary audience for the essay, attendance and participation in discussion by all students are essential. In addition to regularly scheduled class meetings, instructors will hold frequent conferences with students.

## 200-Level Courses Approved for the Major

Students may take up to two of the following courses for credit toward the English major.

**207 Twentieth-Century Biography** Spring. 4 credits.

M W F 12:20. D. Novarr.

An introduction to some forms of modern biography, traditional and experimental, to see how writers have represented and illuminated character and achievement. Subjects range from Leonardo da Vinci and Martin Luther to George Washington, F. Scott Fitzgerald, and Marilyn Monroe; writers from Freud and Erikson to Lytton Strachey, Virginia Woolf, and Norman Mailer. Consideration of the values of biography, biographical "truth," the relation of biography to history, psychology, ethics, and the novel.

**247 Major Nineteenth-Century Women Novelists (also Women's Studies 248)** Fall. 4 credits

M W F 1:25. J. F. Blackall.

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 for 1983 are Austen, *Persuasion*; C. Brontë, *Jane Eyre*; E. Brontë, *Wuthering Heights*; Gaskell, *Mary Barton*; Stowe, *Uncle Tom's Cabin*; Eliot, *The Mill on the Floss*; Gilman, "The Yellow Wallpaper"; Chopin, *The Awakening*. In addition, the 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.

**251 Twentieth-Century Women Novelists (also Women's Studies 250)** Spring. 4 credits.

M W F 1:25. M. Hite.

In this course we will be especially concerned with self-consciously experimental novels and with the questions such novels raise about vision or style. Novels we will be reading include Virginia Woolf's *The Waves*, Gertrude Stein's *Three Lives*, Djuna Barnes's *Nightwood*, Doris Lessing's *The Golden Notebook*, and Margaret Atwood's *Surfacing*.

**253 The Modern Novel** Fall 4 credits.

M W F 12:20. S. P. Mohanty.

A survey of the modern novel, with some attention to its social and cultural context. We shall read novels and shorter fiction by such writers as James, Conrad, Joyce, Kafka, Woolf, and Thomas Mann, as well as more contemporary works by Gabriel Garcia Marquez, Toni Morrison, and Salman Rushdie.

**273 Irish Culture** Fall 4 credits.

M W F 10:10. P. L. Marcus.

An interdisciplinary survey of Irish culture from earliest times to the present. Topics include medieval literature and mythology, early Irish social life, the Irish language, and the visual arts, and the decline of the Gaelic order and corresponding rise of the Anglo-Irish ascendancy. The modern literary revival will receive particular attention, and major works by Yeats, Synge, Joyce, O'Casey, and others will be studied in relation to historical and political developments from the Young Ireland movement of the 1840s to the Revolution and Civil War of 1916–23. The course will conclude with a consideration of post-Revolutionary literature and of the continuing Ulster crisis. No prerequisites.

**277 Folklore and Literature** Fall 4 credits.

T R 2:30–3:45. A. Lurie.

An introduction to traditional American and British folklore—folk speech, rhymes, riddles, proverbs, ballads and songs, myths, legends, tales, superstitions, and customs—combined with the study of works of American and British literature that have made extensive use of folk sources. For example, we will read the classic ballads together with ballads by Burns, Keats, Yeats, and Merwin; fairy tales with Christina Rossetti's *Goblin Market*; and animal tales and myths together with Faulkner's *The Bear*. Students will also collect and analyze original folk materials.

## Courses that Satisfy the Major Prerequisite

**270 The Reading of Fiction** Fall or spring.

3 credits. Each section limited to 18 students.

Recommended for prospective majors in English.

Fall: open to freshmen who have received advanced placement in English. Spring: open to other qualified freshmen. Upperclass students admitted as space permits. May be used to satisfy either the Freshman Seminar requirement or the distribution requirement in the humanities, but not both.

M W F 10:10, 11:15, 1:25, or 2:30, or T R 10:10–11:25 or 12:20–1:35.

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—Bellow, Chekhov, Conrad, Faulkner, Joyce, Mann, Kafka, and others.

**271 The Reading of Poetry** Fall or spring

3 credits. Each section limited to 18 students.

Recommended for prospective majors in English.

Fall: open to freshmen who have received advanced placement in English. Spring: open to other qualified freshmen. Upperclass students admitted as space permits. May be used to satisfy either the Freshman Seminar requirement or the distribution requirement in the humanities, but not both.

M W F 10:10 or 1:25, or T R 10:10–11:25.

Designed to sharpen the student's ability to understand and respond to poetry. Readings in the major periods, modes, and genres of poetry written in English.

**272 Introduction to Drama** Fall or spring.

3 credits. Each section limited to 18 students.

Recommended for prospective majors in English.

Fall: open to freshmen who have received advanced placement in English. Spring: open to other qualified freshmen. Upperclass students admitted as space

permits. May be used to satisfy either the Freshman Seminar requirement or the distribution requirement in the humanities, but not both.

M W F 11:15 or 1:25, or T R 2:30–3:45.

Selected masterworks by such playwrights as Sophocles, Ibsen, and Shaw introduce the chief idioms and styles of Western dramatic tradition. The course work will consist of discussions and papers as well as a special project related to the plays being produced by the Department of Theatre Arts. The course will be taught in small sections.

**275 The American Literary Tradition** Fall or

spring. 3 credits. Recommended for prospective majors in American studies.

Fall: T R 12:20–1:35, D. Fried. Spring: M W F 9:05, M. J. Colacurcio.

The problem of an American national literature is explored through the reading and discussions of eight texts representing the four principal periods in American literary history. Not a survey, this course focuses on the relations of the texts to each other, the role of Americanness in those relationships, and the assumptions about history with which critical appreciation must engage. Works by such writers as Franklin, Hawthorne, Dickinson, Melville, Twain, Wharton, James, Stein, and Hemingway.

**280–281 Creative Writing** 280, fall; 281, spring.

3 credits each term. Each section limited to 18

students. Recommended for prospective majors in

English. Prerequisite for English 281:

recommendation from English 280 instructor.

M W 9:05, 10:10, 12:20, 2:30, or 3:35, or T R 9:05, 12:20, or 2:30.

An introductory course in the theory and practice of writing narrative prose, poetry, and allied forms.

## 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. There are no specific prerequisites except as noted for English 382–383 and 384–385.

## Major Periods of English Literature

**313 Middle English Literature in Translation** Fall 4 credits.

M W F 12:20. R. E. Kaske.

Readings from Middle English literature in translation, excluding Chaucer. Though texts vary, a typical selection would be Arthurian romances such as Lagamon's *Brut*, the *Alliterative Morte Arthure*, *Sir Gawain and the Green Knight*, and Malory's *Morte d'Arthur*; Middle English lyrics and plays; and major poems such as *Piers Plowman*, *The Pearl*, the other works of the *Gawain*-poet, Gower's *Confessio Amantis*, *The Owl and the Nightingale*, and *The Land of Cockayne*.

**318 Saga as Historical Novel: An Introduction to Saga Literature** Fall 4 credits.

M W F 11:15. J. Harris.

A survey of saga literature concentrating upon the greatest of the family sagas: *Njals saga*, *Laxdaela saga*, *Gisla saga*, *Egils saga*, *Grettis saga*, and *Hrafnkels saga*, etc. All readings will be in English translation; there are no prerequisites.

**[320 The Sixteenth Century: Tudor Culture**

4 credits. Not offered 1983–84 ]

**322 The Seventeenth Century** Spring 4 credits.

M W F 10:10. D. Novarr.

The main traditions in poetry—Metaphysical, neoclassic, and the Spenserian inheritance—with emphasis on John Donne, Ben Jonson, Andrew Marvell, and on the genres they utilized: lyric, love elegy, formal satire, epithalamion, verse epistle, ode, hymn, death elegy, mock-epic. Also, consideration of the major work in prose of Bacon, Burton, Browne, Walton, and Bunyan, and of the King James Version of the Bible; prose style; popular prose forms: essay, character, letter, biography.

**330 Restoration and Eighteenth-Century Literature** Spring 4 credits.

M W F 1:25. F. Bogel.

The first half of the course will focus on Wycherley, Dryden, Swift, Pope, and Fielding; the second half on Boswell, Johnson, Sterne, Gray, and Cowper. Close reading of texts in a variety of genres will be guided by such topics as the nature of satire and irony; the languages of the ridiculous and the sublime; the authority and fallibility of human knowledge; connections among sentimentality, melancholy, and madness; and the search for images of heroic presence and substantial experience.

**333 The Eighteenth-Century English Novel** Fall 4 credits.

M W F 1:25. H. Shaw.

The rise of the novel in eighteenth-century England. Why did the novel become a dominant literary genre in this period? What can these works tell us about the nature of fiction or about their historical moment and our own? Novels by Defoe, Fielding, Richardson, Sterne, Radcliffe, Burney, and Austen.

**340 The Romantic Poets** Fall 4 credits.

M W F 11:15. S. M. Parrish.

A close reading of the poems of Blake, Coleridge, Wordsworth, Byron, Shelley, and Keats, together with some of their letters and their critical writings. With the help of selected critical works of recent years we will try finally to arrive at some plausible definitions of Romanticism.

**[345 The Victorian Period** 4 credits. Not offered 1983–84 ]**348 The Female Literary Tradition: Wollstonecraft to Woolf (also Women's Studies 348)** Spring 4 credits.

M W F 12:20. M. Jacobus.

A survey of the (mainly British) "female literary tradition" from the French Revolution to early twentieth-century modernism. The course will trace the dual legacies of Romanticism and revolution through their monstrous and gothic forms, exploring their repressed presence in Victorian women's fiction, until they surface again in the writing of the 1848 revolution and after. As well as the social protest literature of the mid-nineteenth century, we will look at the literature of the (female) uncanny, through which Victorian women writers confront their inner worlds, before turning to the emergence of the "new woman" and utopian women's fiction at the end of the nineteenth century and to the beginnings of twentieth-century modernist experiment by women. Texts will include works by Wollstonecraft, Austen, Mary Shelley, Emily and Charlotte Bronte, Eliot, Barrett Browning, Gaskell, Gilman, Schreiner, and Woolf.

**350 The Early Twentieth Century (to 1914)** Fall 4 credits.

M W F 10:10. D. R. Schwarz.

Critical study of major works by Hardy, Conrad, Lawrence, Joyce, Eliot, Yeats, Hopkins, Wilde, and others. While the emphasis will be upon individual works, some attempt will be made to place the authors and works within the context of literary and intellectual history. The course will seek to define the development of literary modernism in England by reference to these authors' innovations in themes and techniques. These literary works will be examined as part of a transition in British culture that takes place between 1890 and 1914.

**351 Modern Literature since 1914** Spring 4 credits.

M W F 10:10. J. Stallworthy.

A survey of modern English, Anglo-Irish, and Anglo-Welsh fiction, poetry, and drama by Shaw, Lawrence, Joyce, Forster, Woolf, Waugh, Yeats, Eliot, O'Casey, Auden, Beckett, Pinter, and others. Although the emphasis in lectures and discussions will be upon individual works, the wider context of literary, intellectual, and social history will also be considered.



Complementing the texts, film versions of certain novels will be shown, and there will be some taped recordings of the poets.

## Major English Authors

### 319 Chaucer Spring 4 credits.

M W F 11:15. R. T. Farrell.

The course will center on a close reading of the major *Canterbury Tales*, the *Troilus*, 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.

### 327 Shakespeare Fall. 4 credits.

M W F 9:05. B. B. Adams.

An introduction to the works of Shakespeare, based on a selection of plays representative of the stages of his artistic development and the range of his achievement.

### 329 Milton Spring 4 credits.

M W F 9:05. G. Teskey.

An introduction to the poetry of John Milton.

## Major Periods of American Literature

### 361 Early American Literature Fall. 4 credits.

M W F 10:10. M. J. Colacurcio.

The literature of ideas produced by America's Puritan and Enlightenment writers: Bradford, Taylor, Edwards, and Franklin. The first achievements of the national literature: Irving, Cooper, Poe, and Hawthorne.

### 362 The American Renaissance Spring. 4 credits. Recommended but not required: English 361.

M W F 1:25. M. J. Colacurcio.

America's literary maturity at midcentury: the individual masterpieces and the interrelated careers of Emerson, Thoreau, Hawthorne, Melville, Whitman, and Dickinson.

### 363 The Age of Realism and Naturalism Fall. 4 credits.

T R 10:10. M. Seltzer.

The literary expression of new attitudes toward American society and culture between the Civil War and the early years of the twentieth century. We will read representative works by writers such as Mark Twain, W. D. Howells, Henry James, Edith Wharton, Stephen Crane, Kate Chopin, and Theodore Dreiser.

### 364 American Literature in the Twentieth Century Spring. 4 credits.

M W F 10:10. C. Strout.

A study of important writers from the time of the first World War to the end of the second who deal with characteristically modern problems, whether as innovators or traditionalists. The main focus will be on the novel, but memoirs and essays will be included. Such writers as Adams, Cather, Lewis, Hemingway, Fitzgerald, Dos Passos, Steinbeck, Cozzens, Wright, McCarthy, Faulkner, and Bellow will be considered.

### [365 American Literature since 1945 4 credits. Not offered 1983-84]

## Genres and Special Topics

### 366 The Earlier American Novel: Nathaniel Hawthorne to Henry James Spring. 4 credits.

M W F 11:15. D. McCall.

A survey of major American novels of the nineteenth century. Writers studied include Nathaniel Hawthorne, Herman Melville, Mark Twain, and Henry James.

### [367 The Modern American Novel between the Wars 4 credits. Not offered 1983-84]

### 368 The Contemporary American Novel Fall. 4 credits.

M W F 1:25. M. Hite.

A reading of some major American novels written after 1945. Works by Bellow, Hawkes, Pynchon, Morrison, Barth, and others.

### 370 The Nineteenth-Century English Novel Spring. 4 credits.

M W F 12:20. P. Sawyer.

Survey of works by major English novelists in the nineteenth century. Probable reading list will include Austen, *Pride and Prejudice*; Thackeray, *Vanity Fair*; Dickens, *Little Dorrit*; Bronte, *Wuthering Heights*; Eliot, *The Mill on the Floss*; Conrad, *Lord Jim*; Hardy, *Tess of the D'Urbervilles*.

### 372 English Drama (also Theatre Arts 372) Spring. 4 credits.

M W F 10:10. S. McMillin.

Important events in the English theatre from the beginning to the twentieth century. Plays by Marlowe, Shakespeare, Jonson, Webster, Wycherly, Dryden, Behn, Congreve, Sheridan, Shelley, Shaw, and others. Relationships between play houses, dramatic texts, and politics.

## Creative and Expository Writing

### 382-383 Narrative Writing 382, fall; 383, spring. 4 credits each term. Each section limited to 15 students. Prerequisite: English 280-281 or permission of instructor.

M W 1:25 or 2:30, or T R 2:30, plus conferences to be arranged. Instructors to be announced. The writing of fiction; study of models; analysis of students' work.

### 384-385 Verse Writing 384, fall; 385, spring. 4 credits each term. Each section limited to 15 students. Prerequisites: English 280 and 281 and permission of instructor.

T 2:30-4:25. Fall: P. Janowitz, A. Ammons. Spring: P. Janowitz, K. Hathaway. The writing of poetry; study of models; analysis of students' poems; personal conferences.

### [386 Autobiographical Writing 4 credits. Not offered 1983-84.]

### 388-389 The Art of the Essay 388, fall; 389, spring. Limited to 18 students. Prerequisites: permission of the instructor. Interested students should submit a writing sample to the appropriate professor before the beginning of the term.

Fall: M W 10:10 and conferences to be arranged; W. Slatoff. Spring: M W 2:30 and conferences to be arranged; C. Levy.

For both English majors and nonmajors who have done well in such courses as Freshman Seminars or English 288-289 and who desire intensive practice in writing expository and personal 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 limited by prerequisite or permission of the instructor.

### 403 Poetry and Crisis: Four Poets and Four Problems Fall. 4 credits.

M W F 2:30. R. Kirschten.

We will spend three weeks on each of four poets, whose work will be paired with a representative critical problem. The poets and problems are James Dickey and ritual violence, John Berryman and self-destruction, A. R. Ammons and self-unity, and Marianne Moore and retroactive confusion.

### [409 Freud as Imaginative Writer and Reader (also Comparative Literature 411) 4 credits. Not offered 1983-84.]

### 411 Introduction to Old English (also English 611) Fall. 4 credits.

Hours to be arranged. T. D. Hill.

The aim of the course is to teach students to read Old English as accurately and fluently as possible. While the primary emphasis is upon acquiring a reading knowledge of the language, we will also be concerned with the linguistic and literary problems presented by the texts we cover.

### 415 The English Language Spring. 4 credits. M W F 1:25. B. B. Adams.

A basic survey of the historical development of English from the Anglo-Saxon period to the present, with special reference to the needs and interests of students of literature.

### 417 Studies in Chaucerian Poetics Fall. 4 credits. T R 2:30. L. Patterson.

Explorations of problems of narrative form, authorial intention, historical context, and literary authority in the *House of Fame*, *Troilus and Criseyde*, and selected *Canterbury Tales*. The course will place a special emphasis upon the relationship between current theoretical interests (deconstruction, feminism, hermeneutics, and "new" historicism) and medieval literature.

### 427 Studies in Shakespeare Fall and spring 4 credits each term.

Fall: Courtesy, Romance, and Shakespearean History M W F 10:10. C. Levy.

A study of themes and patterns in Shakespeare's later history plays, *Richard II*, 1 & 2 *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 Countess of Pembroke's Arcadia*. Among topics to be explored are growth, responsibility, play, order, and community.

Spring: The Major Tragedies

M W F 9:05. A. Caputi.

This course will highlight a close reading of *Hamlet*, *Macbeth*, *King Lear*, and *Antony and Cleopatra* against a background of the pertinent traditions in tragedy. The work will feature both lectures and discussions and will include some attention to textual problems, sources, and critical opinion.

### [429 Milton and Romantic Poetry 4 credits. Not offered 1983-84]

### 441 Romantic Fictions, Romantic Selves Fall. 4 credits.

M W F 1:25. M. Jacobus.

What are the fictions by which Romantic poets and novelists represent themselves and their relation to writing? What means do they use to articulate coherent (or divided) selves? How are these fictional selves sustained, fragmented, or undone? We will explore the ways in which such fictions intersect with the central Romantic concerns of language, politics, and the imagination, looking particularly at the dimensions of irony, theatricality, and time as they delineate or deconstruct the self of the Romantic writer. Works will include Wordsworth's *Prelude*, Keats's *The Fall of Hyperion*, Byron's *Childe Harold*, and Shelley's *Prometheus Unbound*, along with novels by Godwin, Mary Shelley, and Hogg (*Caleb Williams*, *Frankenstein*, and *The Confessions of a Justified Sinner*, respectively) and De Quincey's autobiographical *Confessions of an Opium Eater*.

### 442 Romantic Movement in Poetry, Painting, and Graphic Arts (also History of Art 459) Fall. 4 credits.

T 2:30-4:30. J. Viscomi.

In this course we will examine the works of English Romantic poets and artists whose experiments with media have significantly changed our understanding of art. Works include the art and literature of the Picturesque, watercolor paintings by Sandby, Cozens, and Turner; prints by Blake, Gainsborough, and Rowlandson; and lyrical poetry of Wordsworth,

Coleridge, Shelley, and Keats. The similarities among these diverse arts, both in technique and theme, will be discussed, as will the Romantics' attempts to redefine the value of art and the role of the artist in society.

**446 Victorian England: Three Revolutions** Spring. 4 credits.

M W F 1:25. P. Sawyer.  
An introduction to the history of ideas in the nineteenth century and to some key literary texts. To a large extent the "modernness" of modern thought derives from changes that occurred in Victorian England, particularly from revolutions in thinking about nature, religion, and society. We will begin with two Romantic writers, Wordsworth and Cobbett, then move to the radical critique of industrial society by writers like Carlyle, Dickens, and Marx, then to changing concepts of science and human spirituality in Tennyson, Ruskin, and Darwin. We will conclude with works that embody modern ideas of nature and social destiny: Hardy's poems and Shaw's play, *Major Barbara*.

**448 The Art and Poetry of William Blake (also History of Art 454)** Spring. 4 credits.

T R 2:30–3:45. J. Visconti.  
An examination of the complete Blake: printmaker, painter, and poet. Special attention will be paid to the illuminated books, color-print drawings, and tempera paintings, and the techniques by which they were made.

**450 The History of the Book** Spring. 4 credits. Limited to 20 students. Prerequisite: permission of instructor.

T 7–9 p.m. D. Eddy.  
Morphology of letters (calligraphy and type). Abbreviations and their cultural significance. Printing and its terminology. The book trade. Texts and their transmission. The book as a physical object. The impact of the book on social and economic changes. The book as a work of art.

**453 Victorians and Modernists: Literary Legends from Wilde to Woolf (also Women's Studies 453)** Spring. 4 credits.

M 2:30–4:30 plus one hour to be arranged.  
S. Siegel.  
What influence do Art and Life exert on each other? Should Art be judged according to moral categories? Should some Art be censored? In what ways are Art and politics related? What role does gender play in our view of Art? Does art play in our view of gender? These questions, which divided the Victorians, were addressed at the trials of Oscar Wilde. The first half of the semester the seminar will read the transcripts of those trials, reports of the event in the periodical press, and the writings of Wilde and his contemporaries. The second half the seminar will read W. B. Yeats, James Joyce, G. B. Shaw, Ezra Pound, T. S. Eliot, Wyndham Lewis, Gertrude Stein, and Virginia Woolf on issues of art, politics, and gender, which were raised but not resolved by the later Victorians.

**454 Irish Drama and Theatre (also Theatre Arts 434)** Spring. 4 credits. Prerequisite: some theatre history or dramatic literature work at the 300 level, or permission of instructor.

T 2:30–5. S. Williams.  
An examination of the role theatre played in Irish society in the first thirty years of the twentieth century. The course will be centered around the plays of Yeats, Synge, and O'Casey, though plays by minor dramatists such as Lady Gregory, Colum, and Fitzmaurice will be read. Specific focus will be upon the uses theatre makes of nationalism and vice versa, and upon the relationship between theatre and national myth.

**455 Contemporary American Theatre: Avant-Garde and Beyond** Fall. 4 credits.

T R 10:10. T. C. Murray.  
The course will study the nature of American avant-garde theatre, from the mid-sixties to the present.

What are the aesthetics, aims, and social attitudes of the avant-garde? How does the avant-garde differ from more traditional American drama? How are the claims of the avant-garde related to the concerns of contemporary political theatre, ethnic theatre, feminist theatre? The course will also consider the world of performance art and theory. Readings will include texts by Shepard, Rabe, Mamet, Guare, Baraka, Milner, Ward, Wilson, Anderson, Durang. Ideally, we can also arrange a study weekend to see theatre in New York City.

**456 Edith Wharton, Willa Cather, and Eudora Welty (also Women's Studies 456)** Spring. 4 credits.

T R 2:30–3:45. 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 achievements as regionalist writers, and for their practice of the craft of fiction. Reading in 1984: 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, *A Curtain of Green*, *The Wide Net*, *The Golden Apples*, and *The Robber Bridegroom*. Discussion format with three essays.

**457 The American South in the South American Novel: A Close Study and Comparison of the Fiction of William Faulkner and Gabriel Garcia Marquez** Spring. 4 credits.

M W F 3:35. L. Herrin.  
We will read and discuss at least four books apiece by these (in Faulkner's words) "sole proprietors" of fictional worlds. Certainly Faulkner's *The Sound and the Fury* and *Absalom, Absalom!* and Garcia's *One Hundred Years of Solitude* and *Autumn of the Patriarch* will be among them. We will discover what we will discover, but I am very much interested in the nature of Faulkner's influence on Garcia's work and perhaps, by extension, in what the American South and South America have fictionally in common. You will be expected to read, write interpretive papers, and talk.

**458 Masterworks of Modernism** Fall. 4 credits.

M W F 1:25. P. L. 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*; Pound, *Maunderley*, the *Cantos*; Eliot, *The Waste Land*, *Four Quartets*; Woolf, *Mrs. Dalloway*, *To the Lighthouse*; and Yeats, *The Tower*, *Last Poems*.

**463 The Political Novel in America** Fall. 4 credits. Limited to 15 students.

M W 2:30. C. Strout.  
A study of ideas, historical contexts, and methods of politically oriented novels by important writers from after the Civil War to the present. Such figures as Adams, Chesnut, Steinbeck, Dos Passos, Hemingway, Wright, Ellison, Cozzens, and Vidal (among others) will be included. Previous work in American literature, history, or government recommended.

**464 American History and Literary Imagination** Spring. 4 credits.

M W 2:30. S. C. Strout.  
A study of the interplay between the historical and the literary imagination in short story, drama, and novel about controversial American issues such as the Salem witchcraft trial, the Nat Turner slave revolt, Huey Long's career, the Oppenheimer security hearing, and the Rosenberg spy case. Texts include documentary sources, critical theory, and historical commentary as well as primary literary works by such writers as Hawthorne, Melville, Arthur Miller, Heinrich Kipphardt, William Styron, Robert Penn Warren, and E. L. Doctorow.

**466 Poetry of the Fifties, Sixties, and Seventies** Spring. 4 credits.

M W 2:30. P. Janowitz.  
This seminar will include reading some of the major poets of the last three decades with the aim of studying their formal and thematic tendencies and exploring the influences that have shaped them, while still focusing on the importance of the individual artists. Poets whose work we will examine include W. C. Williams, Alan Ginsberg, Robert Lowell, Marianne Moore, Elizabeth Bishop, Sylvia Plath, A. R. Ammons, and John Ashbery.

**470 Studies in the Novel** Fall and spring. 4 credits each term.

Fall: Faulkner and Patrick White. Limited to 25 students.  
T R 12:20–1:35. W. Slatoff.  
Study and discussion of novels by Faulkner and Patrick White. White, a Nobel Prize winner, is an Australian writer whom many are coming to recognize as one of the major voices of this century. One purpose of the course is to introduce more readers to White. Another is to view the two voices and visions in relation to one another.

Spring: Conrad, Lawrence, and Joyce. Limited to 15 students. Prerequisite: permission of the instructor.  
T R 12:20–1:35. D. R. Schwarz.

A critical study of major fiction of Conrad, Lawrence, and Joyce. Readings will focus on Conrad and Joyce but will include one major novel by Lawrence. The last seven weeks will be spent on *Ulysses*. An effort will be made to show how the innovations that each author brings to the novel form derive from the demands of his characteristic themes.

**476 Women's Poetry (also Women's Studies 476)** Fall. 4 credits. Limited to 25 students. Prerequisite: permission of the instructor.

T R 10:10. 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.

**480–481 Seminar in Writing** 480, fall; 481, spring. 4 credits. Limited to 15 students. Prerequisites: English 382–383 or 384–385, and permission of instructor.

Fall: W 2:30–4:25, L. Herrin. Spring: T 12:20–2:15, J. McConkey.  
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 discussions of the students' manuscripts and published works that individual members have found of exceptional value.

**482 Poetics for Poets and Critics** Spring. 4 credits. Limited to 15 students.

J. Stallworthy.  
Designed for poets prepared to take Yeats's advice, "... learn your trade, /Sing whatever is well made," and for critics wishing to study the ways in which the principal verse forms of English poetry have been adopted and adapted through the centuries. Each week's assignment will be an example of the form under discussion, from blank verse and ballad, sonnet, and villanelle, to "shaped" and "concrete" poems.

**488 Writing about Literature** Spring. 4 credits. Limited to 15 students.

M W F 10:10. D. Fried.  
This is a class for upperclass students—preferably seniors—who want more practice writing and who are curious about why people write about literature in the variety of ways they do. Short exercises will be assigned each week and commented upon, but the discussion will focus on the institutional contexts in which writing about literature is produced and

consumed and on the relations among various kinds of discourse—classroom talk, literary criticism, literary scholarship, literary theory, et cetera.

**491 Honors Seminar I: Four Novelists** Fall. 4 credits.

T R 2:30–3:45. E. Rosenberg.  
The four novelists are Dickens, Hardy, Gide, and Mann, and the texts I propose to examine are *Oliver Twist*, and either *Bleak House* or *Little Dorrit*; *Mayor of Casterbridge* and *Jude the Obscure*; *The Immoralist*, *Straight Is the Gate*, and *Pastoral Symphony*; *Dr. Faustus* and *Felix Krull*.

**492 Honors Seminar II: The Art of Narrative in the English Renaissance** Spring. 4 credits.

M W F 11:15. G. Teskey.  
A study of the restless variety of ways in which stories were told in England in the sixteenth and seventeenth centuries, before the emergence of the novel as the dominant narrative form. Some of the forms to be examined are Ovidian verse-narrative, prose romance, picaresque adventure, ballad, biography, historical narrative, and allegory. Major figures to appear are Spenser, Sidney, Marlowe, Chapman, Nashe, and Shakespeare (*Cymbeline*). While each work is to be examined critically, larger theoretical questions about narrative will provide a unifying framework for discussion.

**493 Honors Essay Tutorial I** Fall or spring. 4 credits. Prerequisite: senior standing and permission of the chairperson of the honors committee.  
Staff.

**494 Honors Essay Tutorial II** Fall or spring. 4 credits. Prerequisite: English 493 and permission of the chairperson of the honors committee.  
Staff.

**495 Independent Study** Fall or spring. 2–4 credits. After consulting their major adviser, students should apply to the director of undergraduate studies for permission to take independent study. Permission will be granted only to students who present an acceptable prospectus and who have secured the agreement of a faculty member to serve as supervisor for the project throughout the term.

**496 Teaching and Research** Fall or spring. 1–2 credits. May not be used in satisfaction of the English major.  
Staff.

For students who, with the consent of a professor, assist in the teaching of that professor's course.

## Courses Primarily for Graduate Students

Permission of the instructor is a prerequisite for admission to courses numbered in the 600s. These are primarily intended for graduate students, although qualified undergraduates are not excluded. Undergraduates seeking admission to a 600-level course should consult the appropriate instructor. The list of courses given below is illustrative only; a definitive list, together with course descriptions and class meeting times, will be published in a separate department brochure before course enrollment each term.

**602 Advanced Old Norse: Poetry and Poetics (also German 611)** Fall. 4 credits.  
J. Harris.

**611 Introduction to Old English (also English 411)** Fall. 4 credits.  
T. D. Hill.

**612 Beowulf** Spring. 4 credits.  
J. Harris.

**613 Middle English Literature** Fall. 4 credits.  
R. E. Kasse.

**619 Chaucer** Spring. 4 credits.  
R. E. Kasse.

**621 Spenser** Spring. 4 credits.  
C. V. Kasse.

**627 Shakespeare: The Tragedies** Fall. 4 credits.  
E. G. Fogel.

**628 Elizabethan and Jacobean Drama** Spring. 4 credits.  
H. S. McMillin.

**632 The Later Eighteenth Century** Fall. 4 credits.  
F. Bogel.

**641 Romantic Autobiography** Fall. 4 credits.  
M. Jacobus.

**642 Studies in Romantic Drama** Spring. 4 credits.  
R. Parker.

**646 Victorian Prose** Fall. 4 credits.  
P. Sawyer.

**647 Thackeray and James** Spring. 4 credits.  
J. F. Blackall.

**648 Dickens and His Circle** Fall. 4 credits.  
E. Rosenberg.

**653 Emergence of Modernism** Spring. 4 credits.  
S. Siegel.

**664 Frost, Eliot, Stevens** Fall. 4 credits.  
R. Morgan.

**666 Literary Naturalism** Fall. 4 credits.  
M. Seltzer.

**667 Autobiography in America** Spring. 4 credits.  
D. McCall.

**670 Evolution of the Novel I** Spring. 4 credits.  
H. Shaw.

**672 Theory of the Novel** Fall. 4 credits.  
D. R. Schwarz.

**673 Forms of Poetry** Spring. 4 credits.  
D. Fried.

**674 Feminist Literary Theory and Psychoanalysis** Spring. 4 credits.  
M. Jacobus.

**678 Philosophy and Theory of Tragedy** Fall. 4 credits.  
T. C. Murray.

**693 Marxism and Literature (also Comparative Literature 693)** Fall. 4 credits.  
S. P. Mohanty.

## Graduate Seminars

Permission of the instructor is a prerequisite for admission to any course numbered in the 700s. Most of these courses may be limited in enrollment at the discretion of the instructor. For course descriptions see the department brochure.

**701 Introduction to Research and Scholarly Methods** Fall. 2 credits.  
S. M. Parrish.

**702 Claims of Theory** Spring. 2 credits.  
M. Seltzer.

**723 John Donne** Fall. 5 credits.  
D. Novarr.

**742 Wordsworth** Spring. 5 credits.  
S. M. Parrish.

**752 Conrad** Spring. 5 credits.  
D. R. Schwarz.

**753 Yeats** Fall. 5 credits.  
J. Stallworthy.

**763 Hawthorne** Fall. 5 credits.  
M. J. Colacurcio.

**764 Faulkner** Spring. 5 credits.  
W. J. Slatoff.

**780.1 M.F.A. Seminar: Prose** Fall. 5 credits.  
A. Lurie.

**780.2 M.F.A. Seminar: Poetry** Fall. 5 credits.  
K. A. McClane.

**781.1 M.F.A. Seminar: Prose** Spring. 5 credits.  
W. J. Slatoff.

**781.2 M.F.A. Seminar: Poetry** Spring. 5 credits.  
R. Morgan.

**793 Master's Essay** Fall or spring. No credit.  
Staff.

**794 Directed Study** Fall or spring. 5 credits.  
Staff.

**795 Group Study** Fall or spring. 5 credits.  
Staff.

**796 Teaching and Research** Fall or spring. 5 credits.  
Staff.

## Related Courses in Other Departments

In addition to courses offered by the Department of Comparative Literature, the Women's Studies Program, and the Africana Studies and Research Center, the following courses will be of particular interest to English majors and graduate students in English.

## Comparative Literature

### Great Books (Comparative Literature 201–202)

### Rhetoric and Technology (Comparative Literature 315)

### The European Novel (Comparative Literature 363–364)

### Studies in the Lyric: Dante, Scape, and Yeats (Comparative Literature 411/611)

### Gadamer's Hermeneutics (Comparative Literature 698)

### The Hermeneutic Tradition (Comparative Literature 699)

## Society for the Humanities

### Virgil's *Eclogues*: Images of Cultural Change (Society for the Humanities 413)

### The Aristotelian Tradition in the Early and High Middle Ages (Society for the Humanities 417)

### The Aristotelian Tradition in the Later Middle Ages (Society for the Humanities 418)

### The Rhetoric of Renaissance Humanism (Society for the Humanities 421–422)

## French

See Modern Languages, Literatures, and Linguistics, pp. 153 and 164.

## Geological Sciences

D. L. Turcotte, chairman; A. L. Bloom, director of undergraduate studies (211 Kimball Hall, 256-5267); S. B. Bachman, W. A. Bassett, J. M. Bird, L. D. Brown, J. L. Cisne, A. K. Gibbs, B. L. Isacks, D. E. Karig, S. Kaufman, R. W. Kay, J. E. Oliver, F. H. T. Rhodes, W. B. Travers

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 and the employment of geologists have greatly increased.

There are fifteen faculty members, including Cornell's president, in the department, and forty to fifty 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 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, 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. In order to develop skills in observing the natural earth, geology majors attend a six-week summer field camp, usually during the summer following their junior year. Cornell has recently established a joint summer field camp with Harvard and Yale in the Sierra Madre of Wyoming.

### The Major

The prerequisites for admission to a major in geological sciences in the College of Arts and Sciences are two of the two-semester sequences of courses chosen from the following, or their equivalents: Biological Sciences 101–103 and 102–104, Chemistry 207–208, Mathematics 191–192, and Physics 112–213. Geological Sciences 101–102 is recommended, but a student with a strong foundation in mathematics and science may be accepted as a major without completion of 101–102.

Majors take the five core courses in geological sciences, a summer field geology course, 6 credits of additional course work from geological sciences courses numbered 300 or 400, and a third two-semester sequence chosen from the courses in biological sciences, chemistry, mathematics, and physics listed above, plus an additional course in one of these fields at an intermediate or advanced level.

#### Core Courses

- 325 Structural Geology
- 355 Mineralogy
- 356 Petrology and Geochemistry or 358 Petrology and Petrography
- 376 Sedimentology and Stratigraphy
- 388 Geophysics and Geotectonics

Prospective majors should consult one of the following departmental major advisers: W. A. Bassett, 222 Kimball Hall; W. B. Travers, 219 Kimball Hall; J. Oliver, 209 Kimball Hall; A. L. Bloom, 211 Kimball

Hall; or A. K. Gibbs, 224 Kimball Hall, 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, 210 Kimball 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 a senior thesis (Geological Sciences 490). Students interested in applying should contact their advisers during the second semester of the junior year.

### Courses

For course descriptions see the Geological Sciences listing in the College of Engineering.

## German Literature

P. Hohendahl, chairman; H. Deinert, director of undergraduate studies; E. A. Blackall, I. Ezerгалis, S. L. Gilman, A. Groos, J. C. Harris, C. A. Martin, P. W. Nutting.

The Department of German Literature offers courses in German, medieval German, Yiddish, and Old Icelandic literatures. These courses reflect the heterogeneous composition of the department. They range from close readings of major texts through courses in culture and intellectual history. Major areas of specialization cover the period from the early Middle Ages to the twentieth century, with emphasis on literature since 1750. The department often cosponsors courses with the Departments of Music, History of Art, Theatre Arts, and Comparative Literature, and with the Medieval Studies and Women's Studies programs.

For information about majors and courses, see Modern Languages, Literatures, and Linguistics, p. 156.

## Government

I. Kramnick, chairman; B. R. O'G. Anderson, M. G. Bernal, S. Buck-Morss, W. J. Dannhauser, A. T. Dotson, M. J. Esman, B. Ginsberg, S. Jackson, G. McT. Kahin, M. Katzenstein, P. Katzenstein, E. W. Kelley, E. G. Kenworthy, R. King, R. N. Lebow, P. Leeds, T. J. Lowi, D. Meyers, T. J. Pempel, J. Rabkin, R. H. Rosecrance, M. Rush, L. Scheinman, M. Shefter, V. Shue, S. G. Tarrow, N. T. Uphoff, P. Vaughan

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

For a major in government the following requirements must be completed: (1) three of the following introductory courses: Government 111, 131, 161, 181; (2) a minimum of 24 additional credits in government department courses numbered 300 or above; (3) in related subjects, a minimum of 12 credits selected with the approval of the adviser from courses numbered 300 or above in the Departments

of Anthropology, Economics, History, Philosophy, Psychology, and Sociology. S-U options are not allowed for any course taken to fulfill major requirements.

Juniors and seniors majoring in the Department of Government who have superior grade records may apply for supervised study in government with a particular instructor, whose consent is required. Admission is by application only.

**Cornell-in-Washington program.** Government majors also have an opportunity to apply to the Cornell-in-Washington program, in which students take courses and undertake a closely supervised internship during a fall or spring semester. For further information see p. 10 and p. 98.

**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 concerning course selection, foreign study programs, et cetera.

**International Relations Concentration.** See the description under Special Programs and Interdisciplinary Studies, pages 209–210.

**Honors.** Each year a small number of well-qualified students are selected to enter the honors program. Applications are due in April from sophomores and juniors who would like to enter the program the following year. Those selected begin by taking the honors seminar, Government 400. In their senior year, honors students define, research, and write a thesis of some sixty to eighty pages in length, working individually with a member of the faculty. The descriptions of Government 494 and 495, given on p. 136, explain how this process is divided into two tutorials and what is expected of the student at different stages. Students are not allowed to take Government 499 their senior year from the same member of the faculty who supervises their work in 494 and 495. The decision to award honors and in what degree is made by a faculty committee chosen for that purpose, based on the student's record in government courses, the student's overall record at Cornell, and the quality of the thesis. For more information about the honors program and for application forms, students should come to 125 McGraw Hall.

### Introductory Courses

Students registering for introductory courses should register for the lecture only. Sections will be assigned during the first week of class.

#### 111 The Government of the United States Spring, 3 credits.

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.

#### 131 Introduction to Comparative Government and Politics Spring, 3 credits

N. T. Uphoff.

A survey of the institutions, processes, and major problems of politics and government in contemporary states. The structures and ideologies of different regimes, the relationships of individuals and groups to the state, the shaping and implementation of public policy, the regulation of political conflict, and the adaptation of political systems to changing conditions.

#### 161 Introduction to Political Theory Fall, 3 credits.

W. J. Dannhauser.

A survey of the development of Western political theory from Plato to the present. Readings from the work of the major theorists; an examination of the relevance of their ideas to contemporary politics.

**181 Introduction to International Relations** Fall 3 credits.

R. N. Lebow.

An introduction to the basic concepts and practice of international politics.

## Freshman Seminars

**100 Freshman Seminars** Fall or spring. 3 credits. Seminars will be offered in both the fall and spring terms. Consult pp. 206–207, the supplement issued by the department, and the Freshman Seminar booklet for course descriptions and instructors.

## Major Seminars

**300 Major Seminars** Fall or spring. 4 credits. Consult the supplement issued by the department for course descriptions and instructors. Admission is by application only. Forms are provided each term for students to indicate their seminar preferences and are available in 125 McGraw Hall. Nonmajors may be admitted upon application, but government majors are given priority. Majors are encouraged to take at least one seminar course during the junior or senior year.

The following courses are open to sophomores, juniors, and seniors without prerequisites unless otherwise indicated.

## American Government and Institutions

Government 111 is recommended.

**[301 The Politics of Regulation** 2 credits. Not offered 1983–84.]

**[302 The Impact and Control of Technological Change** 4 credits. Not offered 1983–84.]

**[303 American Democracy and the Limits to Growth** 4 credits. Not offered 1983–84.]

**[309 Interpretation of American Politics** 4 credits. Not offered 1983–84.]

**310 Power and Poverty in America** Spring. 4 credits.

R. King.

The United States is a stratified society conspicuous for great disparities in the allocation of income and wealth. Given democratic political institutions, one might have expected substantial popular efforts at redistribution. After reviewing the surprisingly small net fiscal effect of the federal government, we shall turn to explicitly welfare programs, surveying their particular forms and results. The principal goal for the term is to examine poverty policies insofar as they shed light on the conventional social science question: Who rules America? Attention will be given to competing interpretations of the partition of political power, to the modes of organization and participation of the poor, and to conditions necessary for significant readjustments in policy focus.

**[311 Urban Politics** 4 credits. Not offered 1983–84.]

**312 Urban Affairs Laboratory** Fall and spring. 4 credits. Open to both undergraduate and graduate students. Application required to assure balanced enrollment from different colleges and majors. Applications available in 125 or B29 McGraw Hall. Course fee, \$20.

P. C. Vaughan.

An interdisciplinary course in urban affairs that emphasizes learning through participation in a

complex gaming simulation. Students assume roles of decision makers in a simulated city and test their solutions to environmental, economic, social, and political problems. Issue-related readings and lectures provide complementary theoretical focus.

**313 The Nature, Functions, and Limits of Law** Spring. 4 credits.

K. Clermont.

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.

**[314 Common Law and Lawyers in America** 4 credits. Not offered 1983–84.]

**[316 The American Presidency** 4 credits. Not offered 1983–84.]

**317 Political Parties and Elections** Spring. 4 credits.

B. Ginsberg.

The relationship between citizen participation and public policy is one of the central questions of democratic politics. This course will focus on American voting behavior, the role of political parties, and the links between citizens' choices at the polls and the behavior of public officials.

**318 The American Congress** Spring. 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.

**[319 American Political Behavior** 4 credits. Not offered 1983–84.]

**[321 Public Policy and Public Revenues** 4 credits. Not offered 1983–84.]

**[322 Criminal Justice** 4 credits. Not offered 1983–84.]

**323 The "Fourth" Branch** Fall. 4 credits.

J. Rabkin.

The national administrative branch is examined. Particular attention is given to the constitutional and political problems that result from the rise of administrative power.

**[327 Civil Liberties in the United States** 4 credits. Not offered 1983–84.]

**[328 Constitutional Politics: The United States Supreme Court** 4 credits. Not offered 1983–84.]

**[329 Race, Gender, and Politics** 4 credits. Not offered 1983–84.]

**353 The Feminist Movement and Public Policy (also Women's Studies 353)** Fall. 4 credits.

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, 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.

**[406 Politics of Education** 4 credits. Not offered 1983–84.]

**[411 Political and Economic Power in Cities** 4 credits. Not offered 1983–84.]

**[412 Size of the State** 4 credits. Not offered 1983–84.]

**[414 The Administrative State** 4 credits. Not offered 1983–84.]

**[424 Political Change in the United States** 4 credits. Not offered 1983–84.]

**[426 Science, Technology, and Public Policy** 4 credits. Not offered 1983–84.]

**428–429 Government and Public Policy: An Introduction to Analysis and Criticism** 428, fall; 429, spring. 4 credits each term. Open to undergraduates with permission of the instructor.

T. J. Lowi.

The analysis and criticism of public policies and the governments and politics responsible for them is stressed in Government 428. 429 is a weekly workshop for a smaller group, concentrating on problems for research, writing, and publication.

## Comparative Government

Government 131 is recommended.

**[326 Eastern Europe Today: Economics, Government, and Culture (also Russian Literature 329 and Economics 329)** 4 credits. Not offered 1983–84.]

**330 Soviet Union: Politics, Economics, and Culture** Spring. 4 credits.

M. Rush, G. Gibian, G. Staller.

Interdisciplinary survey of the USSR since the Revolution, with emphasis on contemporary developments.

**332 Politics and Society in France and Italy** Fall. 4 credits.

S. G. Tarrow.

A comparative treatment of the political traditions, governmental institutions, and policy problems of two countries with deep social cleavages, vigorous multiparty systems, and special connections to the United States. Special attention is given to problems of economic planning and social policy, the role of the communist party in each country, and the place of Italy and France in Europe.

**333 Government and Politics of the Soviet Union** Fall. 4 credits.

M. Rush.

A focus on the politics of the top leaders, the institutions through which they operate, and the impact of their policies on the Soviet people. Emphasis is also on phases in the development of the Soviet system and on the ways in which the Soviet Union served as the prototype for all subsequent Communist states, as well as on the variant forms that have appeared in other states.

**334 Business and Labor in Politics** Spring. 4 credits.

T. J. Pempel.

Historically, business and labor have been critical elements in shaping the specific politics of most advanced industrial democracies. Land grants to United States railroad magnates, unionization and class consciousness in continental Europe, the development of social welfare programs, and colonization and imperialism are but a few of the foremost examples. Today such interactions are similarly crucial in such diverse areas as the rise of multinational corporations, immigrant labor, strikes by public-sector employees, racial and class exclusionism in unions, environmental pollution,



consumer protection, and electoral financing. The historical and contemporary roles of business and labor in such areas are examined in different industrialized societies.

**[335 Cuba: Culture and Revolution]** 4 credits. Not offered 1983–84.]

**[336 The Ethnic Dimension in Politics]** 4 credits. Not offered 1983–84.]

**340 Latin American Politics** Fall. 4 credits.

E. Kenworthy.

An introduction to the politics and society of some Latin American nations, chosen for their significance politically or theoretically. Cultural heritage, economic strategies, and international relations form part of a discussion of why politics takes the forms it does in this region.

**[341 Society and Politics in Central Europe]** 4 credits. Not offered 1983–84.]

**[342 Government and Politics of Canada]**

4 credits. Not offered 1983–84.]

**[344 Government and Politics of Southeast Asia]**

4 credits. Not offered 1983–84.]

**346 Politics in Contemporary Japan.** Spring. 4 credits.

T. J. Pempel.

The focus will be on the political, social, and economic delimiters of policymaking in postwar Japan, with some particular attention given to ideological conflict, political parties and elections, the bureaucracy, the consumer movement, student protest, defense policy, and economic penetration of Southeast Asia.

**347 Chinese Government and Politics** Fall. 4 credits.

V. Shue.

An examination of the politics of modern China, including the breakdown of the traditional order and the revolutionary struggle of the Chinese Communist party. Primary emphasis on the institutions, methods, policies, and problems of the Communist regime since 1949.

**[348 Politics of Industrial Societies]** 4 credits. Not offered 1983–84.]

**349 Political Role of the Military** Fall. 4 credits.

B. Anderson.

Comparative study of selected modern states and types of political systems in which the military have played a major role in domestic politics. Attention is given to the social and ideological character of the politicized military and various forms of military government.

**[350 Comparative Revolutions]** 4 credits. Not offered 1983–84.]

**351 India: Social and Economic Change in a Democratic Polity** Spring. 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.

**[352 Society and Politics in Saudi Arabia (also Near Eastern Studies 398)]** 4 credits. Not offered 1983–84.]

**354 America in the World Economy** Spring. 4 credits.

P. Katzenstein.

Unemployed auto workers in Detroit and the woodstoves in New England signal an important change in America's relation to the world economy. This course characterizes these changes in a number of fields (trade, money, energy, technology), explains them as the result of the political choices of a declining imperial power, and examines their consequences for America and international politics.

**[355 From Politics to Policy: The Political Economy of Choice]** 4 credits. Not offered 1983–84.]

**356 Elites and Society: The Political Economy of Power** Spring. 4 credits.

N. T. Uphoff.

For students who have an interest in the nature and uses of power in politics. Consideration of how power has been treated by earlier political thinkers and by contemporary social scientists. Propositions will be formulated and critiqued about the distribution and consequences of power in America, other industrialized societies, and in the Third World, and their implications for the making of public policy. A game-simulation, "Third World Power Play," is undertaken at the end of the course.

**[357 Political Development in Western Europe]** 4 credits. Not offered 1983–84.]

**358 Politics of the Middle East (also Near Eastern Studies 294)** Fall. 4 credits

V. Dann.

An examination of the Middle East conflict, including domestic and foreign determinants of Arab and Israeli policy. The impact of major-power conflict on Middle Eastern politics, the sources of instability in local regimes, and the problem of small-state dependence on the superpowers.

**365 Social Movements and Politics in Industrial Societies** Spring. 4 credits.

S. G. Tarrow.

Studies of historical and contemporary social movements and left-wing parties in Western Europe and the United States, with an emphasis on the relations between movement strategies, between political alliances and policy outcomes.

**[430 The Politics of Productivity: Germany and Japan]** 4 credits. Not offered 1983–84.]

**[435 Politics of Decentralization and Local Reform]** 4 credits. Not offered 1983–84.]

**446 Comparative Communism** Spring. 4 credits.

M. Rush.

This seminar deals with regimes that claim to be committed to the Marxist-Leninist program for the realization of socialism and communism. Similarities and differences among countries of the Soviet bloc, China, and Yugoslavia are investigated.

**[456 Policymaking in Britain and France]** 4 credits. Not offered 1983–84.]

**457 Comparative Public Law: Legal Controls on Government in Europe and America.** Fall. 4 credits.

J. Rabkin, S. Jasanoff.

This course examines the legal and institutional framework of government regulation in advanced industrial nations. It considers how different national systems balance the need for adaptive policy with the desire for legal consistency, the demands of specialized expertise with the claims of democratic control, the protection of private rights with the vindication of public interests. Case studies dealing with civil liberties and health and safety regulation in several different countries will illustrate these problems.

**[459 Politics in Contemporary Europe: The Politics of the Left]** 4 credits. Not offered 1983–84.]

## Political Theory

Government 161 is recommended.

**[361 Modern Ideologies: Liberalism and Its Critics]** 4 credits. Not offered 1983–84.]

**[363 Classics in Political Thought]** 4 credits. Not offered 1983–84.]

**364 Liberty, Equality, and the Social Order** Fall. 4 credits.

D. Meyers.

We consider the accounts of liberty and equality provided by several major political philosophers, including Hobbes, Locke, Rousseau, and Mill, and we examine their proposals for embodying these concepts in political institutions. We will also read recent discussions of these issues.

**[367 The Logic of Liberalism]** 4 credits. Not offered 1983–84.]

**368 Economic Models of Politics** Fall. 4 credits

E. W. Kelley.

Economic factors influencing the structure of political systems and economic models of such systems are considered. The rationalistic presumptions underlying some such models are introduced and modified. Applications to enduring policy arenas may be made.

**[373 Feminist Political Thought]** 4 credits. Not offered 1983–84.]

**[375 American Political Thought]** 4 credits. Not offered 1983–84.]

**376 Marx after One Hundred Years** Fall. 4 credits

S. Buck-Morss.

The meaning and contemporary relevance of the central concepts of Marxist theory: dialectics, class, ideology, history, social revolution, the state, the family, imperialism, modes of production, the "iron laws" of capitalism, and the communist goal. Readings in the original texts. Lectures and discussion on their applicability to the current crisis in the world economy and the varieties of political response (Euro-communism, socialism, feminism, ecology movements, antinuclear movement, the New Right, corporatism, neoconservatism, nationalism, and national liberation movements).

**379 Freud** Spring. 4 credits.

S. Buck-Morss.

Analysis of Freud's own writings on psychological and social theory, clinical practice, and analytic method. Consideration of the political implications of these texts and their philosophical contribution. Critical discussion of post-Freudian revisions of the theory, including Left Freudianism, ego-psychology, and radical feminism.

**[466 The Repressed Feminine in the Writings of Marx]** 4 credits. Not offered 1983–84.]

**467 Current Topics in Political Philosophy (also Women's Studies 467)** Spring. 4 credits.

D. Meyers.

This course will explore the philosophical dimensions of current political issues. Topics will vary but could include equal opportunity, capital punishment, free speech, and the like. Emphasis will be placed on careful analysis of issues and methods of normative justification.

**468 The Theory and Politics of Liberal Feminism** Spring. 4 credits.

M. Katzenstein, D. Meyers.

A study of the assumptions and arguments of liberal feminism. The course will have three foci. It will examine the doctrines of liberal feminism, consider how these doctrines translate into political issues and programs, and appraise the merits of the critique from the left and right.

## International Relations

Government 181 is recommended.

### 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 to the Peace Studies Program.

### 382 Integration in the World System Fall. 4 credits.

S. Jackson.  
This seminar explores theories of interdependence, regional integration, and dependency as particular applications of the generalized concept of integration in the world system. Readings include works by Deutsch, Haas, Keohane, Nye, Lenin, Cardoso.

### 383 Theories of International Relations Spring. 4 credits.

R. Rosecrance.  
A survey of relevant theories of international relations, emphasizing war prevention and conflict resolution. Theories will be tested against the international experience of the past two centuries.

### 384 War and Peace in the Nuclear Age (also Physics 206). Spring. 4 credits.

P. Stein.  
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.

### 385 Contemporary American Foreign Policy Fall. 4 credits.

R. Rosecrance.  
An analysis of the dilemmas that have confronted American foreign policy since 1945, both specific problems and more general questions of capabilities, priorities, and morality.

### [386 Structure and Process in the Global Political Economy 4 credits. Not offered 1983-84.]

### 387 The United States and Asia Fall. 4 credits.

G. McT. Kahin.  
The relations of the United States with the major states of Asia and with those smaller countries (especially Vietnam) with which it has been particularly concerned are analyzed. Attention is also given to the relationship of American policy to the Asian policies of France, Great Britain, and Soviet Russia.

### 389 International Law Fall. 4 credits.

L. Scheinman.  
Characteristics of international law: its theoretical foundations, principles, processes, and relationship to international politics. Emphasis on law-in-action. Attention to both traditional problems (intervention, coercion, and the scope and limits of adjudication) and contemporary trends and processes (arms control, outer space, exploitation of seabed resources, the individual in international law, and cooperative patterns of socioeconomic relations at global and regional level). Content may vary according to international events.

### [390 The Foreign Policy of China 4 credits. Not offered 1983-84.]

### 478 Accumulation on a World Scale Spring. 4 credits.

S. Jackson.  
In *Accumulation on a World Scale*, Samir Amin has developed the nearest thing to a comprehensive explanation for underdevelopment in the periphery of the world system to emerge from recent critical theorists of global political economy. In this course we will examine Amin chapter by chapter, looking at the growing body of systematic evidence relevant to an evaluation of Amin's theory.

### 479 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.

### [480 Foreign Economic Policies of Advanced Industrial Societies 4 credits. Not offered 1983-84.]

### [481 Foreign Policy of the USSR 4 credits. Not offered 1983-84.]

### [482 Imperialism and Dependency 4 credits. Not offered 1983-84.]

### 483 Political and Economic Interdependence Spring. 4 credits.

R. Rosecrance.  
The political and economic interdependence among nations, both historical and contemporary, is studied. The international systems of mercantilism, nineteenth-century laissez-faire, and economic nationalism of the 1930s are reviewed briefly. Emphasis is on contemporary situations and data.

### 484 Defense Strategy Fall. 4 credits.

R. N. Lebow.  
The requirements for military defense and the problems caused by it are analyzed. Subjects include nuclear deterrence reasoning, military strategy, approaches to disarmament, the working of military-industrial complexes, and defense budgeting and policy procedures.

### 487 Covert Intervention as an Instrument of American Foreign Policy Spring. 4 credits.

G. McT. Kahin.  
The character and conduct of a dimension of policy that has attained major importance in recent decades. Focuses on cases drawn from Asia, Latin America, and the Middle East, with analyses of the impact of these interventions on the socioeconomic and political character of the countries subject to them and of the extent to which these policies influence and constrain the overt level of U.S. policy.

### 488 Crisis and Change in the International Political Economy (also Business and Public Administration NCE 510) Spring. 4 credits.

Prerequisite: permission of instructor.  
P. Katzenstein.  
This course analyzes the political consequences of the decline in American power for the international economy. The political constraints and opportunities of global economic competition are examined in a number of different geographical settings: Western Europe, Eastern Europe, Latin America, the Middle East, and Asia. Guest lectures by other members of the Cornell faculty will be an integral part of the course.

## Political Methodology

### [391 Human and Social Statistics 4 credits. Not offered 1983-84.]

## Honors Courses

Each April a limited number of sophomore and 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.

### 400 Honors Seminar: Political Analysis Fall. 4 credits. Limited to students admitted to the honors program.

M. Katzenstein.

### 494 Honors Thesis Clarification and Research

Fall. 4 credits. Limited to students who have successfully completed Government 400 or are taking it concurrently.

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. Research on the thesis begins this semester.

### 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, submitted in two bound copies by the end of classes. 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 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 in 499 a government major may take while at Cornell, but he or she may count no more than 4 credits toward fulfillment of the major. Students who wish to continue taking Government 499 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. The permission of the instructor is required.

### 499 Readings Fall or spring. 1-4 credits.

Staff.

## Graduate Seminars

Qualified undergraduates are encouraged to apply for seminars listed with 600 course numbers. Students may consult the supplement that lists graduate courses, available in the department office.

## Field Seminars

### 601 Scope and Methods of Political Analysis Fall. 4 credits.

S. Jackson.

This seminar offers an overview of the main problem areas and theoretical orientations in the four subfields

of contemporary political analysis: political theory, American politics, comparative politics, and international relations. Selected topics, including questions of research design, are treated through a reading of the best contemporary literature. The broad issues of the philosophy of social science or specific techniques of analysis may also be addressed.

**[602 Field Seminar in Political Methodology]** 4 credits. Not offered 1983–84.]

**603 Field Seminar in American Politics** Fall. 4 credits.

B. Ginsberg.

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.

**604 Field Seminar in Public Policy** Fall. 4 credits.

E. W. Kelley.

An introduction to the study of public policy. Various analytical approaches will be presented: models of public choice and political economy; analysis of bureaucratic politics, executive and political leadership, and interest groups and public opinion; economic analysis of public finance and welfare economics; and organization theory, game theory, and decision theory as these relate to the analysis of public policy formation and applications.

**605 Field Seminar in Comparative Politics** Spring. 4 credits.

V. Shue, S. Tarrow.

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, nation building and political integration.

**606 Field Seminar in International Relations** Spring. 4 credits.

R. N. Lebow, P. Katzenstein.

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.

**607 Field Seminar in Political Thought** Fall. 4 credits.

W. J. Dannhauser.

An introduction to political theory through a reading of selected classics in political thought from Plato to Marx.

#### American Government and Institutions

**[616 Theories of Judicial Review]** 4 credits. Not offered 1983–84.]

**[619 Labor in American Politics]** 4 credits. Not offered 1983–84.]

**[621 Elections and Public Policy]** 4 credits. Not offered 1983–84.]

**[623 Capitalism, the State, and the Economy]** 4 credits. Not offered 1983–84.]

#### Public Policy

**628–629 Politics of Technical Decisions I and II (also B&PA NPA 515–516 and City and Regional Planning 541–542)** 628, fall; 629, spring. 4 credits each.

Staff.

Political aspects of decision making in areas traditionally regarded as technical. Subjects include 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.

#### Comparative Government

**[636 Political Development of the European Welfare State]** 4 credits. Not offered 1983–84.]

**[637 Comparative Theories of Decentralization]** 4 credits. Not offered 1983–84.]

**639 Politics of the Soviet Union** Fall. 4 credits.

M. Rush.

A reading seminar on major works dealing with the Soviet political system, with special emphasis on higher politics, recent foreign policy, the nationality question, and the Brezhnev succession.

**[642 The Politics of Communalism]** 4 credits. Not offered 1983–84.]

**645 Politics in China** Spring. 4 credits.

V. Shue.

A wide-ranging introduction to contemporary Chinese political theory and practice. Several different approaches to the study of Chinese politics are considered and evaluated. Topics include the political legacies of the revolutionary civil war; the development of Mao Tse-tung's thought and the terms of political discourse in China; the collectivization of agriculture and the evolution of Chinese economic development strategy; forms of political participation and the means by which social cleavages gain political expression; the system-wide impact of the Cultural Revolution; the social bases of ultraleftism; Chinese revisionism; and patterns of elite politics.

**647 Political Anthropology: Indonesia (also Anthropology 628)** Spring. 4 credits. Prerequisite: reading knowledge of Indonesian.

B. R. O'G. Anderson, J. T. Siegel.

The relationship of politics to culture is studied through the works of such authors as Ivan Simatupang, Pramoedya Ananta Toer, and Armiijn Pané.

**648 Political Economy of Change: Rural Development in the Third World** Fall. 4 credits.

N. T. Uphoff.

The substantive focus is on economic, social, and political change in Third World countries, particularly with reference to rural development. The analytical approach integrates economic, social, and political factors into a common framework for dealing with policy choices and political action. Special attention is given to different instruments for promoting rural development in Third World countries.

**[651 Readings from Mao Zedong]** 4 credits. Not offered 1983–84.]

**652 Political Problems of Southeast Asia** Spring. 4 credits.

G. McT. Kahin.

A broad range of problems are dealt with, the focus different each term.

**[655 Latin American Society and Politics]** 4 credits. Not offered 1983–84.]

**[656 Comparative Institutions and the Welfare State]** 4 credits. Not offered 1983–84.]

**[659 Politics in Postwar Western Europe]** 4 credits. Not offered 1983–84.]

**660 Research Topics on Advanced Industrial Democracies: Social Movements, Collective Protest, and Policy Innovation** Spring. 4 credits.

S. G. Tarrow.

Students will read and carry out case studies on historical or contemporary West European and American protest movements, their programs, and

the responses—whether repressive or policy-innovative—of political elites. Theories of collective action and resource mobilization will be studied and used in explicating cases.

#### Political Theory

**[665 American Political Thought]** 4 credits. Not offered 1983–84.]

**[666 The Political Philosophy of Nietzsche]** 4 credits. Not offered 1983–84.]

**[667 Justice and Equality: The Philosophical Foundation of Public Policy]** Not offered 1983–84.]

**[668 Foundations of English Liberalism]** 4 credits. Not offered 1983–84.]

**669 German Social Theory** 4 credits. Fall.

S. Buck-Morss.

Readings in Marx, Nietzsche, Simmel, Tonnies, Weber, Luckach, Adorno, and Habermas.

**670 Readings in Contemporary Social Theory** 4 credits. Spring.

S. Buck-Morss.

Issues will include neo-Marxism, structuralism, poststructuralism, and feminism.

**673 Economic Models of Politics** Fall. 4 credits.

E. W. Kelley.

Both economic factors influencing the structures of political systems and economic models of such systems are considered. The rationalistic presumptions underlying such models are introduced and modified. Applications to enduring policy arenas may be made.

**678 Greek Political Philosophy** Fall. 4 credits.

W. J. Dannhauser.

Studies in the political thought of Plato and Aristotle. Readings will consist of Plato's *Republic* and *Laws*, Aristotle's *Ethics* and *Politics*.

#### International Relations

**686 International Strategy** Fall. 4 credits.

R. Rosecrance.

Doctrines of deterrence and defense, particularly their interaction in American policy since 1945, are focused on. The relationship between doctrine and the type of international system (bipolar or multipolar) is considered, and other means of equilibration in the international system are investigated.

**687 International Relations of Asia** Fall. 4 credits.

G. McT. Kahin.

Studies of the relations of China, Japan, Korea, and the countries of Southeast Asia with one another and with the United States and the Soviet Union, with particular attention to the influence of domestic political factors.

**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 in Third World countries.

## Greek

See Department of Classics, p. 118.

## Hebrew

See Department of Near Eastern Studies, p. 173

## Hindi-Urdu

See Modern Languages, Literatures, and Linguistics, p. 158.

## History

D. K. Wyatt, chairman; D. A. Baugh, S. Blumin, S. G. Cochran, T. H. Holloway, C. Holmes, I. V. Hull, 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, C. A. Peterson, W. M. Pintner, R. Polenberg, W. B. Provine, J. H. Silbey, F. Somkin, B. Strauss, B. Tierney, D. Usner, J. H. Weiss (director of undergraduate studies, 362 McGraw Hall, 256-4370), L. P. Williams, 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 the prerequisite requirement by taking either Introduction to Western Civilization (History 151–152) or Introduction to Asian Civilization (History 190–191) or, alternatively, three courses in European history—one in ancient history; one in medieval, Renaissance, or early modern history; and one in modern history.
- 2) Take history department courses totaling 36 credits (which may include the prerequisite courses) and complete all these courses with a grade of C or better—of the 36 credits, a minimum of 20 must be taken in courses numbered 250 and above.
- 3) Take a minimum of 8 credits in each of two of the following fields: American, European, Asian, Latin American history, or history of science; alternatively, a student may elect to take a total of 16 credits in three of these fields. Credits taken to fulfill the prerequisite requirement (see item (1), above) do not count toward this requirement.
- 4) Take at least one course at the advanced (400 or higher) level.
- 5) Take two courses above the elementary level offered by other departments that relate to the student's area of special interest.

Prospective majors may wish to discuss their projected program with the director of undergraduate studies before formally enrolling with the department.

**Honors.** History majors with an overall B+ average in all their history courses are eligible to enroll in History 400, Honors Proseminar, which is normally taken in the junior year or, at the latest, in the fall of the senior year. (Honors candidates are strongly encouraged to take another 400-level seminar during their junior year.) Upon successful completion of the proseminar, students may become candidates for the degree of Bachelor of Arts with honors in history by submitting to a prospective faculty adviser a written thesis proposal delineating the general area of inquiry for an honors essay, and having the proposal approved by the adviser. The proposal should be submitted as soon as possible after the completion of History 400, normally during the junior year or at the beginning of the senior year.

After acceptance of the proposal by an adviser, honors candidates should then enroll with their advisers in History 302, Supervised Research, during the first term of their senior year. History 302 is a four-credit course that permits honors candidates to conduct research and to begin writing the honors essay. At the end of the first semester of the senior year, as part of the requirements for History 302, the student will submit to his or her adviser a ten-to-fifteen-page overview of the entire thesis or a draft of some substantial section of the thesis and will undergo an oral examination on the broad field of history that the student researched. The examination will be administered by a committee consisting of the student's adviser and one other department member, who will eventually serve as a reader of the thesis. The committee will then recommend whether the student may proceed to enroll in History 401, Honors Guidance, during the final semester of the senior year. History 401 is a 4-credit course that permits honors candidates to complete the honors essay and to prepare both to defend the essay and to demonstrate their understanding of the general historical interests they have pursued within the major. Students who do not take History 400 in their junior year must submit both the thesis proposal and the prospectus by the end of the fall semester of their senior year in order to be eligible to enroll in History 401 by their final semester.

Honors candidates must complete a minimum of 40 credits in history, 8 of which must be History 400–401. The completed thesis will be examined by three readers, including the two faculty members who administered the preliminary oral examination.

The text of the honors essay may not exceed sixty pages except by permission of the chairperson of the honors committee and the student's adviser. Two copies will be due during the third week of April. In May each honors candidate will be given an oral examination administered by the major adviser and one or both of the essay readers. The examination will focus on the specific issues of the essay as well as the broad field of history in which the student has concentrated his or her research (e.g., Periclean Athens, seventeenth-century science, nineteenth-century America).

To qualify for a Bachelor of Arts degree with honors in history, a student must (1) sustain at least a B+ cumulative average in all history courses; and (2) earn at least a *cum laude* grade on the honors essay and on the oral examination.

Students considering the honors program should consult the department during the second term of their sophomore year or early in their junior year.

### Freshman Seminars

**104 Communes and Utopias: Alternative Life Styles in American History** Fall. 3 credits. Limited to 15 students.

MW 2:30. G. C. Altschuler.  
This course examines individual and group critiques of American society and experiments with alternative lifestyles. Topics include the Puritans, the Oneida community, the Mormons, Walden, the Ferrer Colony and Modern school, Vedanta monasteries, Walden II, and contemporary communes.

**106 Democracy and Education: History of Learning in America** Spring. 3 credits.

MW 2:30. G. C. Altschuler.  
A survey of the history of educational thought and institutions from Puritan times to the present, with emphasis on the nineteenth and twentieth centuries. Topics include the family and church as educational institutions, the democratization of education, the emergence of the university, educational testing, and vocational education. John Dewey and progressive education, "alternate education," student radicalism.

**[107 The Family in American History** Not offered 1983–84; next offered 1984–85.  
M. B. Norton.]

**[108 Civil Liberties in the United States** Not offered 1983–84.  
R. Polenberg.]

**[112 The North Atlantic Community and the Wider World** Not offered 1983–84  
T. H. Holloway.]

**143 Family and Community in Modernizing Societies** Fall. 3 credits.

MW 10:10. N. Schwartzbach.  
This course will examine the family and community as critical institutions in modernizing societies. Drawing upon anthropology, sociology, and history, it will explore the relationship between family, community, and modernization. Developments in Japan and Latin America will be compared with those in the United States. Throughout, emphasis will be placed on the critical evaluation of popular assumptions and theoretical perspectives that inform our understanding of the modernization process.  
*Pending approval of the Educational Policy Committee.*

**144 Daily Life in American History** Fall and spring. 3 credits.

TR 12:20–1:35. R. Scott.  
This course will focus on the history of ordinary Americans concerned with the daily aspects of living. It will approach nineteenth- and twentieth-century social history through a study of everyday experience. Most people spend most of their life struggling for daily existence at work, interacting within a family, and living in a community. Changes in these aspects of life are enormously revealing and will be approached mainly through the autobiographies and letters of common people and, for the twentieth century, through oral history.  
*Pending approval of the Educational Policy Committee.*

**[146 America in the Camera's Eye** Not offered 1983–84.  
R. L. Moore.]

**147 Slaves and Slaveholders in Antebellum America** Fall. 3 credits.

MW 12:20. M. P. Lucas.  
Black slavery dramatically shaped the southern and American consciousness. Its legacy encompasses the violent Nat Turner, the "Sambo" stereotype, the brutal overseer, and the cavalier gentleman. This Freshman Seminar will examine that slave society from its origins to the Civil War. Specific topics will include the conditions of slavery, slave personality, the relationship of slave to master, and the world as the slaveowners viewed it. *Pending approval of the Educational Policy Committee.*

**148 The Changing South in the Twentieth Century** Spring. 3 credits.

MW 12:20. M. P. Lucas.  
This Freshman Seminar will investigate the distinctiveness of the American South from the days of Jim Crow to the Carter presidency. Topics include the plight of black and white sharecroppers, race relationships and conflict, white demagogues, the civil rights movement, and the role of history in the southern consciousness. The readings are drawn from historians' analyses, firsthand accounts, and the

fiction of Richard Wright and Flannery O'Connor.  
*Pending approval of the Educational Policy Committee.*

**160 The Politics of Natural Man** Spring. 3 credits.  
M W 9:05. J. Oakley.

An exploration of the uses of descriptions of humanity in the state of nature in the advocacy of political or social programs. The understanding of natural humans both as legal and biological beings has varied widely over the past two thousand years, and the standards and techniques for recreating the state of nature have also changed, but at all times descriptions of man in the state of nature have been employed to support political programs. The course will examine the use of those descriptions as rhetorical devices in political discussion. Readings will range from the Greek philosophers to modern advocates of sociobiological and anthropological approaches to human nature and will include Christian and Marxist descriptions. *Pending approval of the Educational Policy Committee.*

**[161 The Heroic Ideal in Antiquity]** Not offered 1983–84.  
B. Strauss.]

**[171 Revolution and Russian Society]** Not offered 1983–84.  
W. M. Pintner.]

**176 Britain and the Second World War** Spring. 3 credits. Prerequisite: permission of instructor.  
T 3:35, R 2:30–4:30. D. A. Baugh.  
The aim is to uncover the true facts of Britain's conduct and situation from 1936 to 1946. Emphasis is on the fighting on land, sea, and in the air, but preparedness, economic warfare, diplomacy, and imperial power are considered. Topics include the Battle of Britain, the Battle of the Atlantic, and strategic bombing.

**[192 Japan and the West]** Not offered 1983–84.  
J. V. Koschmann.]

**193 China and the West before Imperialism** Spring. 3 credits. Open to freshmen and sophomores. Prerequisite: permission of instructor.  
T R 1:25. C. A. Peterson.

What accounts for the first great passion for things Chinese in the West in the seventeenth and eighteenth centuries and then its recession before the waves of imperialism? This seminar explores this question, tracing the China vogue in thought, literature, art, and the crafts while considering the actual circumstances in the China of the day.

## Underclass Seminars

**203 American Dreams** Fall. 4 credits. Enrollment limited. Permission of instructor required.  
T 2:30–4:30. F. Somkin.

Reading and discussion of key themes that have given a distinctive shape to American society and culture. Ranging from the collective dream of national mission to the individual dream of personal success, topics include the dreams of material abundance, equal justice under law, social redemption through education, and the creation of a democratic art.

**205 Freshman Seminar: The Growth of Political Democracy in the United States** Fall. 3 credits. Limited to 14 students. Prerequisite: permission of instructor.

M 2:30. J. H. Silbey.  
An examination of the democratization of American political life since the American Revolution. Such topics as the expansion of white, black, and women's suffrage and the changing concepts of participation and leadership in American politics will be explored. A number of books and documents covering the topic will be read and discussed and several short papers written.

**208 Anarchism in America and Europe** Spring. 4 credits. Prerequisite: permission of the instructor.  
T R 12:20–1:35. R. Polenberg.  
Topics include Proudhon, Bakunin, and Kropotkin; the Haymarket riot; anarchism and socialism; the IWW and anarcho-syndicalism; anarchists in the Russian Revolution; Emma Goldman and Alexander Berkman; the red scare and the Sacco-Vanzetti case; the Spanish civil war; the libertarian tradition.

**[209 Political History of North American Indians during the Eighteenth and Nineteenth Centuries]** Not offered 1983–84; next offered 1984–85.  
D. H. Usner.]

**214 Seminar on American Foreign Policy** Spring. 4 credits. Open to sophomores. Limited to 12 students; preference will be given to non-history majors. Prerequisite: permission of instructor.

R 2:30–4:15. W. LaFeber.  
The seminar will examine a contemporary American foreign-policy problem, analyzing its various parts and charting the possible alternatives open to policy makers by placing the problem in its historical framework and using, in part, the methods of comparative history. History will be used as a tool to analyze the complexities and opportunities of present foreign-policy dilemmas.

**218 The Russian Military Effort and Foreign Policy** Spring. 4 credits.  
W 12:20–2:20. W. M. Pintner.

An examination of the interrelationship 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.

**219 History of North American Indians** Spring. 3 credits. Prerequisite: permission of instructor.  
W F 10:10. D. H. Usner.

This seminar examines major themes in Native American history from colonial times to the present. Discussions will consider the cultural histories of particular tribes as well as the comparative elements of Indian relations with non-Indians.

**222 Public Life and Literature in Tudor England** Fall. 4 credits. Prerequisite: permission of instructor.  
M W 9:05. 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.

**223 Public Life and Literature in Stuart England** Spring. 4 credits. Prerequisite: permission of instructor.

M W 9:05. F. G. Marcham.  
A study of the chief developments in the political, governmental, and religious life of England in the seventeenth century, and weekly discussions of a selection of Stuart prose, poetry, and drama.

**225 Public Life and Literature in Nineteenth-Century Great Britain** Fall. 4 credits. Prerequisite: permission of instructor.

T R 9:05. F. G. Marcham.  
British political, constitutional, economic, and imperial history are studied in the light of Victorian prose, poetry, and drama. History and literature are both considered: history through lectures and discussions of constitutional documents; literature through comment upon readings. Authors assigned include Macaulay, Carlyle, Tennyson, Mill, Darwin, Huxley, Gilbert and Sullivan, and Shaw.

**226 Public Life and Literature in Twentieth-Century Great Britain** Spring. 4 credits. Prerequisite: permission of instructor.

T R 9:05. 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, Barrie, Maugham, O'Casey, Sherif, and Eliot.

**[227 Modern American Sex Roles in Historical Perspective (also Women's Studies 227)]** Not offered 1983–84; next offered 1985–86.  
M. B. Norton.]

**232 The City in History** Spring. 4 credits. Limited to 12 students.  
R 10:10–12:05. S. Blumin.

Reading and discussion of classic interpretations of the rise, role, and character of cities in ancient Greece, medieval Europe, and nineteenth- and twentieth-century Europe and America. Further reading on the history of a particular city of the student's own choice. Several short papers.

## Comparative History

**274 Foodways: A Social History of Food and Eating** Spring. 4 credits.  
W 2:30–4:30. 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.

**[360 Early Warfare, East and West]** Not offered 1983–84; next offered 1984–85.  
C. A. Peterson.]

**449 Comparative Race Relations in the Americas** Fall. 4 credits.

M 2:30–4:25. T. H. Holloway, M. B. Norton.  
An examination of race relations in the Western Hemisphere since the colonial era. Topics include the origins of slavery in the Portuguese, Spanish, and English colonies; alternative forms of slavery and resistance; the abolition process; and divergent patterns of postabolition race relations in Latin America, the Caribbean, and the United States.

## History of Science

**[281–282 Science in Western Civilization]** Not offered 1983–84; next offered 1984–85.  
L. P. Williams.]

**287–288 History of Biology (also Biological Sciences 201–202)** 287, fall; 288, spring. 3 credits each term. Prerequisite: one year of introductory biology; 287 is not prerequisite to 288.

T R 10:10–11:30. 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. The fall semester covers the period from classical antiquity to 1900. The spring semester is devoted entirely to twentieth-century biology.

**380 Social History of Western Technology** Fall. 4 credits.

M W 1:25; disc. to be arranged. J. H. Weiss.  
Studies in the interaction between technological changes and social changes in Western Europe and America since the eighteenth century. Readings, 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. Course gives special attention to three periods: Britain during the Industrial Revolution, America in the nineteenth century, and America during the Vietnam War.



**447 Seminar in the History of Biology** Fall. 4 credits.

T 2:30–4:30. W. Provine  
Scientific method, creativity, and discovery, viewed from the perspective of the history of biology. Special emphasis will be placed upon the role of aesthetics in biological research.

**448 Seminar in the History of Biology** Spring 4 credits.

T 2:30–4:30. W. Provine.  
The warfare between science and religion from Galileo to the present. Eminent Cornellians from Andrew Dickson White to Frank H. T. Rhodes will be represented in the readings.

**[481–482 Science in Classical Antiquity** Not offered 1983–84.

L. P. Williams.]

**680 Seminar in the History of Nineteenth-Century Physical Science** Spring. 4 credits.

Hours to be arranged. L. P. Williams.

**American History****275 Crime and Punishment: From the Puritans to Mickey Spillane** Spring. 4 credits.

T R 2:30–3:45. F. Somkin.  
A social-historical investigation of how the American literary imagination has dealt with the way of the transgressor. Readings from Arthur Miller, Hawthorne, Cooper, Melville, Van Tilburg Clark, Dreiser, Cozzens, Wouk, Richard Wright, Caine, Hammett, Chandler, and Spillane.

**[311–312 The Structure of American Political History** Not offered 1983–84.

J. H. Silbey.]

**313–314 History of American Foreign Policy** 313, fall; 314, spring. 4 credits each term.

T R S 11:15 with optional section. W LaFeber.  
History 313 examines policy and policy makers from Ben Franklin to Woodrow Wilson. 314 covers Wilson to Reagan. Emphasis is placed on domestic events that shaped foreign policy.

**[318 American Constitutional Development** Not offered 1983–84; next offered 1984–85.

M. B. Norton.]

**321 The Origins of American Civilization** Spring 4 credits.

M W F 1:25. M. Kammen.  
The colonial genesis of American culture and society, with emphasis upon the emergence of distinctive institutions, attitudes, and social patterns. Topics include race relations, religion, politics, movements of protest, and cultural developments.

**[323 Native American History before 1850** Not offered 1983–84; next offered 1984–85.

D. H. Usner.]

**324 Native American History since 1850** Spring. 4 credits.

M W F 12:20. D. H. Usner.  
A survey of North American Indians during the second half of the nineteenth century and the twentieth century. Cultural, economic, and political changes experienced by particular societies will be examined. Emphasis given to conflicts in the territories, comparative reservation histories, government policies, and pan-tribal organizations.

**[325 Age of the American Revolution, 1763–1815** Not offered 1983–84; next offered 1984–85.

M. B. Norton.]

**326 Women in the American Society, Past and Present** Fall. 4 credits.

T R 9:05, plus section to be arranged.  
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, and contemporary feminism.

**[327–328 American Frontier History** Not offered 1983–84.

D. H. Usner.]

**330 The United States in the Middle Period, 1815–1850** Fall. 4 credits.

M W F 10:10; disc to be arranged. J. H. Silbey.  
An analysis of American society from the end of the second war with England to the crisis of 1850, stressing the developing trends of nationalism and sectionalism, the rise and results of Jacksonian democracy, and the internal tensions produced by physical growth and slavery.

**331 The American Civil War and Reconstruction** Spring. 4 credits.

M W F 10:10; disc to be arranged. J. H. Silbey.  
An analysis of the factors leading up to the breakup of the Union, the impact of the war in North and South, and the problems of restoration and reconstruction of the seceded states.

**[332–333 The Urbanization of American Society** Not offered 1983–84; next offered 1984–85.

S. Blumin.]

**336–337 American Social History** 336 fall; 337 spring. 4 credits each term. History 336 is not a prerequisite to 337.

M W F 11:15. S. Blumin.  
A history of American society, with emphasis on the transforming effects of such phenomena as industrialization, urbanization, immigration, national expansion, and institutionalization on the social life of anonymous Americans. The first semester will cover the colonial and Jacksonian eras, with emphasis on the latter; the second semester will focus upon the industrial-urban transformation of the period 1860–1930.

**340 Recent American History, 1917 to 1945** Fall. 4 credits.

T R 12:20; disc to be arranged. R. Polenberg.  
Topics include civil liberties and dissent in World War I; individualism and conformity in the 1920s; radicalism and reform in the New Deal; class, race, and ethnicity; Franklin Roosevelt and World War II; the Holocaust and the atomic age.

**[341 Recent American History, 1945 to the Present** Not offered 1983–84; next offered fall, 1984.

R. Polenberg.]

**344 American Ideas from the Puritans to Darwin** Fall. 4 credits.

M W F 1:25. F. Somkin.  
Ideas, thinkers, feeling, and expression from the seventeenth century to after the Civil War. Topics include Puritanism, the Enlightenment, Jeffersonian and Jacksonian democracy, antebellum reform movements, the attack on natural rights, and the effect of Darwinian evolution on traditional American ideals.

**[345 The Modernization of the American Mind** Not offered 1983–84.

R. L. Moore.]

**[346 Major Themes in American Religious History** Not offered 1983–84.

R. L. Moore.]

**[411 Undergraduate Seminar in American Political History** Not offered 1983–84.

J. H. Silbey.]

**414 Motivations of American Foreign Policy** Fall. 4 credits. Prerequisites: History 314 and permission of instructor.

R 2:30–4:25. W. LaFeber.

**418 Undergraduate Seminar in the History of the American South** Spring. 4 credits. Prerequisite: permission of instructor.

M 2:30–4:30. J. H. Silbey.  
Topic for 1984: Slavery, the slave system, and the crisis of the Union, 1846–1861.

**419 Seminar in American Social History** Fall. 4 credits. Prerequisite: permission of instructor.

R 2:30–4:30. S. Blumin.  
Topic for 1983: Capitalism, class, and community in nineteenth-century North America. Readings, discussion, and original research on the varying impact of capitalist-industrial development on the class and communal systems of American cities, towns, and villages.

**421 Constitutionalism as a Cultural Problem in America** Spring. 4 credits. Prerequisite: permission of instructor.

T 2–4. M. Kammen.  
This seminar (primarily for juniors and seniors, but open to graduate students and law students) will examine the changing role of the U.S. Constitution in American politics and ideological controversy. Coverage will begin with the John Marshall era, but our major concern will be the period 1880–1980.

**[426 Undergraduate Seminar in Early American History** Not offered 1983–84; next offered 1984–85.

M. B. Norton.]

**429 Undergraduate Seminar in Indians of Eastern North America** Spring. 4 credits.

R 10:10–12:05. 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 as well as the impact of European colonialism on tribal societies will be examined. Major topics include fur-trade networks, political relations, removal, and the persistence of Indian communities within eastern states.

**430 Law and Authority in American Life** Spring. 4 credits.

W 2:30–4:25. F. Somkin.  
An undergraduate seminar covering (1) an overview of the development of American law from colonial times to the twentieth century, and (2) an examination of selected topics such as vigilante justice, criminal responsibility, gun laws, the present agony of the criminal justice system, and the dissolution of social authority.

**440 Undergraduate Seminar in Recent American History** Spring. 4 credits. Prerequisite: permission of instructor.

T R 2:30–3:45. R. Polenberg.  
Topic for 1984: The Supreme Court and free speech: Holmes, Brandeis, and Frankfurter.

**[445 Undergraduate Seminar: Deviance and Conformity in a Liberal Society** Not offered 1983–84.

R. L. Moore.]

**[615–616 Seminar in American Cultural and Intellectual History** Not offered 1983–84

F. Somkin.]

**[617–618 Seminar in Recent American Cultural History** Not offered 1983–84

R. L. Moore.]

**[619 Seminar in American Social History** Not offered 1983–84.

S. Blumin.]

**621 National Myths in Comparative Perspective** Fall. 4 credits. This seminar is intended for graduate students and advanced undergraduates. Consent of instructor is required.

R 2–4. M. Kammen.  
Every society has some myth (or myths) about its own identity, characterized by unrealistic beliefs that serve realistic social or psychological functions. The focus of this seminar will be to examine the role of myth in American cultural tradition against the context of European as well as Chinese and Australian traditions. There will also be contextual readings on nationalism and mythology in general.

**626 Graduate Seminar in the History of American Women** Fall. 4 credits.  
T 2:30–4:30. M. B. Norton.

**[627 Graduate Seminar in the History of American Women]** Spring. Not offered 1983–84; next offered 1985–86.  
M. B. Norton.]

**[633–634 Seminar in Nineteenth-Century American History]** Not offered 1983–84.  
J. H. Silbey.]

**710 Colloquium in American History** Spring. 4 credits.  
M 2:30–4:30. J. H. Silbey.  
Examination of the major themes, epochs, and interpretations of American history.

## Asian History

**190 Introduction to Asian Civilizations** Spring. 4 credits.  
T R 11:15 plus disc, M 11:15, 1:25, or 2:30.  
C. A. Peterson and staff.

An introduction to the distinctive cultures of China, India, and Japan, which features an intensive examination of selected topics and periods of particular significance in the history of each.

**191 Introduction to Asian Civilizations in the Modern Period** Fall. 4 credits.  
W F 11:15 plus disc, M 11:15, 1:25, or 2:30.  
S. Cochran.

The history of Asian civilizations in modern times is introduced, focusing on the relationship between key figures and societies. English translations of autobiographies, novels, short stories, diaries, and other documents written by Asians are used to assess the perspectives, social priorities, and historical significance of intellectual and political leaders.

**[390 Art and Society in Modern China]** Not offered 1983–84.  
S. Cochran, M. Young.]

**393 History of China up to Modern Times** Fall. 4 credits.  
T R 10:10 plus an additional hour, M 11:15 or 2:30.  
C. A. Peterson.

A broad examination of the major aspects of Chinese culture and civilization from earliest times to the late imperial period. Seeks to expose both those features maintaining continuity and the significant (but frequently overlooked) instances of change.

**394 History of China in Modern Times** Spring. 4 credits.  
T R 10:10 plus an additional hour, R 12:20, 2:30, or 3:35. S. Cochran.

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.

**395 Indochina and the Archipelago to the Fourteenth Century** Fall. 4 credits.  
T R 11:15 plus one hour to be arranged.  
O. W. Wolters.

A survey of the early history of Indochina and the archipelago, with particular attention to questions raised in the source material concerning religious beliefs and political and social assumptions.

**[396 Southeast Asian History from the Fifteenth Century]** Not offered 1983–84; next offered 1984–85.  
D. K. Wyatt.]

**[397 History of Japan to 1750]** Not offered 1983–84; next offered 1984–85.  
J. V. Koschmann.]

**[398 History of Modern Japan]** Not offered 1983–84; next offered 1984–85.  
J. V. Koschmann.]

**[489 Seminar in Tokugawa Thought and Culture]** Not offered 1983–84.  
J. V. Koschmann.]

**492 Undergraduate Seminar in Medieval Chinese History** Fall. 4 credits. Prerequisite: History 393 or permission of instructor.  
Hours to be arranged. C. A. Peterson.  
Topic for fall 1983: The Mongols in world history.

**493 Self and Society in Late Imperial and Twentieth-Century China** Fall. 4 credits.  
Prerequisite: History 191, 394, or permission of instructor.  
R 2:30–4:30. S. Cochran.  
Conceptions of self and relationships between the individual and society in China from the seventeenth century to the present.

**[691 Chinese Historiography and Source Materials]** Not offered 1983–84; next offered 1984–85.  
C. A. Peterson.]

**693–694 Problems in Modern Chinese History** 693, fall; 694, spring. 4 credits each term.  
Prerequisite: permission of instructor.  
Hours to be arranged. S. Cochran.

**695 The Historiography of Southeast Asia** Fall. 4 credits. Prerequisite: permission of the instructor.  
Hours to be arranged. O. W. Wolters.

**[696 The Historiography of Southeast Asia]** Not offered 1983–84; next offered 1984–85.  
D. K. Wyatt.]

**791–792 Seminar in Medieval Chinese History** 791, fall; 792, spring. 4 credits each term.  
Prerequisite: permission of instructor.  
Hours to be arranged. C. A. Peterson.

**793–794 Seminar in Modern Chinese History** 793, fall; 794, spring. 4 credits each term.  
Prerequisite: permission of instructor.  
Hours to be arranged. S. Cochran.

**[795–796 Seminar in Southeast Asia]** Not offered 1983–84; next offered 1984–85.  
D. K. Wyatt.]

## Ancient European History

**265 Ancient Greece from Homer to Alexander the Great** Fall. 4 credits. Open to freshmen.  
M W 11:15; disc to be arranged. 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.

**373 The Greek City from Alexander to Augustus** Spring. 4 credits. Enrollment limited.

M W 11:15; disc to be arranged. B. Strauss.  
A two-fold search: for Alexander the conqueror and the man, and for the character of the world he created, in which the Greek city was planted as far as Egypt and India. These new cities saw a change from republicanism to monarchy, from community values to individualism, from particularism to ecumenicalism; embraced the new philosophies of Stoicism and Epicureanism; and were the holinesses of a new religion: Christianity. Readings in translation include Arrian, Plutarch, Aristophanes, Menander, Theocritus, Polybius, the Bible, Epicurus, Lucretius.

**381–382 Parents and Children in Athens and Jerusalem (also Society for the Humanities 381–382 and Near Eastern Studies 381–382) Frederick G. Marcham Seminar** 381, fall; 382, spring. 4 credits. Enrollment limited. Permission of instructor required.

Fall: W 2:30–4:30. Spring: irregular class meetings. In spring students will pursue independent work in consultation with the instructors and the class will meet for special events and presentations by class members.  
C. Kronfeld, B. Strauss.

The focus is on the images and reality of parent-child relations in ancient Athens and Israel, with masterpieces of these two central Mediterranean cultures serving as main texts. Questions to be examined both from the historian's and from the literary critic's point of view include parenthood in the Homeric epic and in Biblical narrative, generation gap and the tension between emulation and rebellion, gender stereotypes of parent and child images, and the theme of war and child sacrifice. For comparative purposes attention will be paid also to the images of parent-child relations in modern Greece and Israel as well as in the Greek and Jewish diasporas. Students who wish to read the literature in the original languages will be supplied with appropriate texts.

**[452 The Tragedy of Classical Athens, 479–399 B.C.]** Not offered 1983–84; next offered 1984–85.  
B. Strauss.]

**453 Crisis of the Greek City-State, 415–336 B.C.** Spring. 4 credits. Enrollment limited. Prerequisite: History 265 or permission of instructor.  
M 2:30–4:20. B. Strauss.

The fortunes of the city-state and citizen in an age of uncertainty. Topics include the causes and course of the war between the city-states, the rise of Macedon, changes in the Athenian character, the tension between individual and community, and the decline of classicism and rise of emotionalism. Particular attention will be paid to assessments of Greece's problems in contemporary history, philosophy, oratory, and drama and to developments in religion and art. Readings in translation from Thucydides, Sophocles, Euripides, Aristophanes, Xenophon, Isocrates, Demosthenes, Plato, Aristotle, Plutarch, Isaeus, and Aeschines.

## Medieval, Renaissance, and Early Modern European History

**151–152 Introduction to Western Civilization** 151, fall; 152, spring. 3 credits each term. History 151 is not a prerequisite to 152. Neither 151 nor 152 may be taken as Freshman Seminars.  
T R 9:05; disc to be arranged. L. P. Williams.

A survey of European history. History 151 covers antiquity to the Reformation. 152 spans the seventeenth century to the present day. The major political and social developments and the intellectual

heritage of the West are both studied. A considerable portion of the reading is drawn from contemporary sources.

**[257 English History from Anglo-Saxon Times to the Revolution of 1688]** Not offered 1983–84; next offered spring 1985.  
C. Holmes.]

**[263 The Earlier Middle Ages]** Not offered 1983–84; next offered 1984–85.  
J. J. John.]

**264 The High Middle Ages** Fall. 4 credits.  
T R 10:10–11:25. B. Tierney.  
A survey of medieval civilization from ca. 1100 to ca. 1450, dealing with religious, intellectual, political, and economic developments in Western Europe. Lectures and class discussions.

**[349 Greece in Late Antiquity and Early Byzantine Times, A.D. 306–565]** Not offered 1983–84; next offered 1984–85.  
B. Strauss.]

**350 Early Renaissance Europe** Fall. 4 credits.  
T R 11:15; disc. to be arranged. J. Najemy.  
An exploration of the intellectual, cultural, religious, and political development of Western Europe from the age of Dante, Ockham, and Marsilius, through the several stages of Italian humanism from Petrarch to Pico, down to the generation of Machiavelli and Erasmus, with some attention to the economic, social, and demographic crisis of the fourteenth and fifteenth centuries. Readings and topics about evenly divided between Italy and northern Europe.

**[359 The Early Development of Anglo-American Common Law (also Law 632)]** Not offered 1983–84; next offered fall 1985.  
C. Holmes.]

**[361 The Culture of the Early Renaissance (also Comparative Literature 361 and History of Art 350)]** Not offered 1983–84; next offered fall 1984.  
C. Lazzaro, J. Najemy, and others.]

**[365 Medieval Culture, 400–1150]** Spring. Not offered 1983–84; next offered 1984–85.  
J. J. John.]

**[366 Medieval Culture, 1100–1300]** Spring. Not offered 1983–84; next offered 1985–86.  
J. J. John.]

**367 Church and State During the Middle Ages** Fall. 4 credits. Prerequisite: History 263–264 or permission of instructor.  
T R 3–4:15. B. Tierney.  
Relationships between ecclesiastical and secular authorities and the ways in which these relationships influenced the growth of government in the Middle Ages are considered. Particular attention is given to the growth of medieval constitutionalism.

**[368 Francis of Assisi and the Franciscans]** Not offered 1983–84; next offered fall 1984.  
B. Tierney.]

**[369 The History of Florence in the Time of the Republic, 1250–1530]** Not offered 1983–84; next offered spring 1985.  
J. Najemy.]

**371 History of England under the Tudors and Stuarts** Fall. 4 credits.  
T R 9:05; disc. W 9:05 and 11:15. S. Amussen.  
A lecture-discussion course focusing on particular themes in the history of early modern England. Topics include social and demographic change, popular culture, religion, and political culture. Special attention will be paid to relationships between the themes and political and social conflicts of the period.

**374 War, Trade, and Empire, 1500–1815** Fall. 4 credits.

M W 2:30–4. D. A. Baugh.  
Maritime enterprise, imperial policy, and naval power in the age of expansion. The rise and decline of the Portuguese and Spanish empires are considered, but the emphasis is on English, French, and Dutch rivalry in the Atlantic and Caribbean.

**[468 Undergraduate Seminar in Renaissance History]** Not offered 1983–84.  
J. Najemy.]

**[469 Undergraduate Seminar in Reformation History]** Not offered 1983–84.  
J. Najemy.]

**[663 Seminar in Renaissance History]** Not offered 1983–84.  
J. Najemy.]

**[664–665 Seminar in Latin Paleography]** Fall and spring. Not offered 1983–84.  
J. J. John.]

**666 Seminar in Medieval History** Fall. Not offered 1983–84.  
J. J. John.]

**669 Seminar in Medieval History** Spring. 4 credits. Open to qualified seniors. Prerequisite: Latin.  
Hours to be arranged. B. Tierney.  
Topic for 1984: Pope and general council in medieval theories of church government.

## Modern European History

**152 Introduction to Western Civilization** Spring. 3 credits. No prerequisite. May not be taken as a Freshman Seminar.

T R 9:05; disc to be arranged. L. P. Williams.  
The second half of the European history survey, 152 covers the seventeenth century to the present day. The major political and social developments and the intellectual heritage of the West are both studied. A considerable portion of the reading is drawn from contemporary sources.

**258 English History from the Revolution of 1688 to the Present** Spring. 4 credits.

M W 2:30–4. D. A. Baugh.  
An introductory course encompassing political, economic, imperial, intellectual, and religious developments. Readings include selections from DeFoe, Burke, Paine, Macaulay, Malthus, Mill, and Keynes.

**[352 The End of the Austro-Hungarian Monarchy, 1848–1918]** Not offered 1983–84; next offered fall 1985.  
I. V. Hull.]

**353–354 European Intellectual History in the Nineteenth and Twentieth Centuries** 353, fall; 354, spring. 4 credits each term. History 353 is not a prerequisite to 354.

T R 12:20–1:35. D. LaCapra.  
The focus is on social and cultural thought in France, Germany, and England. Topics include reactions to the French Revolution and industrialization, the definition of conservative, liberal, and radical perspectives; literature and social thought; varieties of existentialism; the birth and development of the social sciences; psychoanalysis and post-Freudian psychology; linguistic philosophy; and structuralism. Readings for the first term include Tocqueville, Mill, Hegel, Marx, Stendhal, Flaubert, Dostoevsky, Nietzsche, and Durkheim. Readings for the second term include Weber, Freud, Wittgenstein, Sartre, Camus, Mann, and Levi-Strauss.

**[355 The Old Regime: France in the Sixteenth, Seventeenth, and Eighteenth Centuries]** Not offered 1983–84.  
S. L. Kaplan.]

**[356 The Era of the French Revolution and Napoleon]** Not offered 1983–84.  
S. L. Kaplan.]

**357 Survey of German History, 1648–1890** Fall. 4 credits.

M W 9:05; disc. W 10:10 or 1:25. I. V. Hull.  
An examination of the social, political, intellectual, and diplomatic history of the German states from the devastation of the Thirty Years' War, through absolutism, the bourgeois revolutions of 1848, and the struggle for unification, to the beginning of the modern industrial state.

**[358 Survey of German History, 1890 to the Present]** Not offered 1983–84; next offered spring 1985.  
I. V. Hull.]

**362 Russian History to 1800** Fall. 4 credits. Open to freshmen.

T R 10:10–11:25. W. M. Pintner.  
The origin and development of the fundamental social, political, economic, and cultural institutions that have determined the nature of contemporary Soviet society.

**363 Russian History since 1800** Spring. 4 credits. Open to freshmen.

T R 10:10–11:25. 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.

**[372 Social and Cultural History of Contemporary Europe]** Spring. 4 credits

M W 1:25; disc to be arranged. J. H. Weiss.  
The transformation of European society and culture in the twentieth century, including a critical examination of modernization as an interpretive framework for social change. Topics will include changes in the structure and values of rural and urban communities; shifts in education, class structure, family life, and patterns of work and leisure; and aspects of popular culture.

**379 History of Poland** Spring. 4 credits.

M W F 10:10; disc R 1:25. R. Blobaum.  
Everything you wanted to know about Polish history and more. The course, through a format of both lecture and discussion, covers the length and breadth of the Polish historical experience from Slavic antiquity to the present. It is divided into three distinct units focusing on the rise and fall of the first Polish state, the period of the partitions and the struggle for national liberation, and the problematic nature of Polish statehood in the twentieth century.

**[383–384 Europe in the Twentieth Century]** Fall and spring. Not offered 1983–84; next offered 1984–85.  
J. H. Weiss.]

**405 Population and History** Fall. 4 credits. Seminar format. Open to sophomores.

R 2:30–4:30. S. L. Kaplan.  
An examination of the impact of the methodology and findings of demography on historical scholarship and the implications of historical research for the study of population. Focus will be on the relationship of population to family and social structure, economic growth, political stability, collective mentality, etc. Readings in European and American history from the Black Plague through the Industrial Revolution.

**409 Seminar on Work in Europe and America** Spring. 4 credits.  
M 2:30–4:30. 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.

**450 Seminar in European Imperialism** Fall 4 credits. Open to upper-level undergraduates. Prerequisite: permission of instructor.

M 12:20–2:20. I. V. Hull.

Focuses on the various theories of imperialism with particular reference to the domestic causes, uses, and repercussions of late nineteenth-century imperialism in Germany, France, and Great Britain.

**[451 Lord and Peasant in Europe: A Seminar in Social History]** Not offered 1983–84.

S. L. Kaplan.]

**454 Eastern Europe Since 1945** Fall. 4 credits. T 12:20–2:15. R. Blobaum.

The social, economic, intellectual, and political history of Eastern Europe since the Second World War. Major issues and events will be examined within the broad context of the changing nature of Soviet domination, the vicissitudes of East-West relations, and general trends affecting the entire region. Special emphasis on the mechanics of the "takeover process" at the end of the war, Stalinization, the Yugoslav experiment, the revolt of East German workers in 1953, the Hungarian revolt of 1956, the Prague Spring and the Warsaw Pact invasion of Czechoslovakia, and the series of political upheavals in Poland.

**[456 Seminar on Germany, 1890–1918]** Not offered 1983–84.

I. V. Hull.]

**[457 Seminar in European Fascism]** Not offered 1983–84; next offered spring 1985.

I. V. Hull.]

**[459 The Making of the English Ruling Class, 1660–1780]** Not offered 1983–84.

D. A. Baugh.]

**467 Seminar in Modern European Political History** Spring. 4 credits. Prerequisite: Permission of the instructor.

Hours to be arranged. J. H. Weiss.

Topic for 1984: Europe and World War II. The military and civilian experience during the war; grand strategy and social change on the home front. The impact of Allied decisions and ideological offensives upon the European theater.

**471 Russian Social History** Fall. 4 credits. Prerequisite: one semester of Russian history or permission of instructor.

M 2:30–4:30. W. M. Pintner.

A seminar devoted to an examination of the diverse social groups that comprise imperial Russia and Soviet society. Includes systematic comparison with other countries.

**474 Topics in Modern European Intellectual History** Spring. 4 credits.

W 1:25–3:25. D. LaCapra.

**476 Documenting the Depression: Film, Literature, and Memory** Fall. 4 credits.

Prerequisite: permission of instructor.

Hours to be arranged: one screening session and one disc per week. 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 and unemployment.

**[477 Seminar on the Politics of the Enlightenment]** Not offered 1983–84.

S. L. Kaplan.]

**[478 Seminar in Eighteenth-Century French**

**• Social History]** Not offered 1983–84.

S. L. Kaplan.]

**[480 Twentieth-Century Britain]** 4 credits. Not offered 1983–84.

D. A. Baugh.

Lectures focus on key personalities. Seminar topics include Ireland, the 1930s, the world wars and their impact, the decline of liberalism and rise of Labour, the roots of Britain's economic problems, and the character of English society.]

**[483 Seminar in Modern European Social History]** Fall. 4 credits. Not offered 1983–84.

J. H. Weiss.]

**[655 Seminar in Eighteenth-Century British History]** Not offered 1983–84.

D. A. Baugh.]

**[656 Seminar in Nineteenth-Century British History]** Not offered 1983–84.

D. A. Baugh.]

**[671 Seminar in the French Revolution]** Not offered 1983–84.

S. L. Kaplan.]

**[672 Seminar in European Intellectual History]** Not offered 1983–84.

D. LaCapra.]

**673 Seminar in European Intellectual History** Spring. 4 credits.

Hours to be arranged. D. LaCapra.

**677 Seminar in Russian History** Fall. 4 credits.

Hours to be arranged. W. M. Pintner.

**678 Seminar in Modern European Social History** Spring. 4 credits.

Hours to be arranged. J. H. Weiss.

Research seminar. Topic for 1984: Education, professional structures, and social stratification since 1800.

**[679 Seminar in European History]** Not offered 1983–84.

S. L. Kaplan.]

## Latin American History

**295 Colonial Latin America** Fall. 4 credits.

M W F 10:10. T. H. Holloway.

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.

**296 Latin America in the Modern Age** Spring. 4 credits.

M W F 10:10. T. H. 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.

**[347 Agrarian Societies in Latin American History]** Not offered 1983–84.

T. H. Holloway.]

**[348 Contemporary Brazil]** Not offered 1983–84.

T. H. Holloway.]

## Honors and Required Graduate Courses

**301 Supervised Reading** Fall or spring. 2 credits. Open only to upperclass students. Prerequisite: permission of instructor.

**302 Supervised Research** Fall or spring. 3 or 4 credits. Open only to upperclass students. Prerequisite: permission of instructor.

**400 Honors Proseminar** Fall or spring. 4 credits. Limited to 15 students. For prospective honors candidates who have permission of instructor.

Fall: T 2–4. M. Kammen.

An introduction to historical writing and modes of research, emphasizing the possibilities and limitations of historical inquiry.

**401 Honors Guidance** Fall or spring. 4 credits. Prerequisites: History 400 and permission of instructor.

**703–704 Supervised Reading** 703, fall; 704, spring. 4 credits each term. Open only to graduate students. Prerequisite: permission of instructor.

**709 Introduction to the Graduate Study of History** Fall. 4 credits. Required of all first-year graduate students.

W 2:30–4:30. D. LaCapra, J. Najemy.

The course is designed to introduce entering graduate students to crucial issues and problems in historiography that cut across various areas of specialization.

## Society for the Humanities Seminars of Interest to History Students

**414 Figurative Arts of Antiquity in the Renaissance** Spring. 4 credits.

T 3:35–5:20. P. P. Bober.

**415 The Myth of Orpheus** Fall. 4 credits.

M 3:35–5:20. F. Graf.

**416 A Pagan Saint: Philostratus's Life of Apollonios** Spring. 4 credits.

M 3:35–5:20. F. Graf.

**417 The Aristotelian Tradition in the Early and High Middle Ages** Fall. 4 credits.

W 3:35–5:20. J. Murdoch.

**418 The Aristotelian Tradition in the Later Middle Ages** Spring. 4 credits.

W 3:35–5:20. J. Murdoch.

**419 Greco-Romans and Gallo-Celts** Fall. 4 credits.

R 3:35–5:20. C. Brousseau.

**420 Grammar in the Middle Ages** Spring. 4 credits.

R 3:35–5:20. C. Brousseau.

**421–422 The Rhetoric of Renaissance Humanism** Fall and spring. 4 credits.

M 1:25–3:10. V. Kahn.

**423 Thinking One's Way Back Into the Past** Fall. 4 credits.

T 1:25–3:10. F. Ahl.

**424 Narcissus at the Well** 4 credits.

T 1:25–3:10. F. Ahl.

**425-426 The Carolingian Renaissance** Fall and spring. 4 credits.

W 1:25-3:10. J. J. John.

The seminar will treat selected aspects of Western European history in the eighth and ninth centuries, the period responsible for the preservation of so much of the Latin classical tradition. Attention will be devoted not only to self-conscious revivals of classical ways but also to unconscious or conscious continuities and modifications of those ways. An attempt will be made both to determine what it was within eighth- and ninth-century society, especially within its monastic milieu, that made classical ways appealing and to define the effects that the interaction of the classical and monastic traditions had on each other. Subjects to be studied will include the bookmaking arts (with particular emphasis on scripts and decoration) and libraries in the fall semester and educational methods, historiography, and literature in the spring semester. Students may enroll in either semester or in both.

**427-428 The Rhetoric of Justice** Fall and spring. 4 credits.

R 1:25-3:10. J. Koffler.

## History of Art

A. Ramage, chairman and director of undergraduate studies; T. M. Brown, R. G. Calkins, E. G. Dotson, H. P. Kahn, C. Lazzaro, T. W. Leavitt, L. L. Meixner, N. Neaher, S. J. O'Connor, A. S. Roe, 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, historic, and cultural contexts. Courses offered by the department cover the mainstream of Western art (classical, medieval, Renaissance, baroque, nineteenth and twentieth century) and non-Western art, including Oriental and tribal traditions. Art history is an integral part of interdisciplinary programs such as the Archaeology Program, Africana Studies, the China-Japan 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 wish 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. These courses should be completed with a grade of C or better and are prerequisites for admission to the major but may not be counted toward fulfillment of the major requirements. In their junior and senior years majors work closely with their advisers to determine acceptable programs in the major field. The program should include at least 30 credits in history of art courses (24 of which must be at the 300 level or higher) and a minimum of two additional courses in this department or in a related area approved by the major adviser. Courses at the 200 level or above taken in the freshman or sophomore years may be counted toward the major provided that the courses are in addition to those taken as prerequisites to the major. 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.** In order 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. Admission into the program requires application to the

department chairperson 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 493 and 494, which entail the preparation of a senior thesis. This program may not be condensed into one semester.

### Freshman Seminars

The history of art courses listed below are offered in the Freshman Seminar Program and as freshman electives but may not be used to satisfy the distribution requirement.

**103 Freshman Seminar in Visual Analysis** Fall or spring. 3 credits.

Fall: M W F 10:10 or 11:15, or T R 10:10-11:25 or 12:20-1:35. Spring: M W F 9:05, 10:10, or 11:15, or T R 10:10-11:25. Staff.

The nature of man-made objects, from tools to cities, including such conventional categories as painting, sculpture, and architecture is examined. Students are introduced to the problems of perceiving such objects and articulating the visual experience. The course is organized by media and themes rather than chronology, and it is a supplement, not a prerequisite, to art history.

**104 How to Look at Works of Art** Fall. 3 credits. Not open to students who have taken History of Art 103.

T R 12:20-1:35. L. L. Meixner.

Several major works of art, primarily paintings, are examined in detail. The cultural and historical contexts in which the works were created and their unique qualities as works of art are considered.

**[106 Art in a Landscape: Traditional Arts in Southeast Asia]** 3 credits. Not offered 1983-84. S. J. O'Connor.]

**[107 Principles of Architecture]** 3 credits. Not offered 1983-84.

T. M. Brown.]

### Introductory Courses

The following courses are designed to introduce students to the processes and methods of art history by means of a systematic examination of a closely related body of visual material. The courses need not be taken in any particular sequence. One 200-level course is normally the prerequisite to courses at the 300 level.

**215 Introduction to Art History: African Art** Spring. 3 credits.

T R 12:20-1:35. N. Neaher.

The cultural foundations of art in sub-Saharan Africa, including an examination of masking traditions; royal arts; body aesthetics and figurative sculpture; and domestic and sacred architecture.

**220 Introduction to Art History: Art of the Classical World (also Classics 220)** Fall. 3 credits. M W F 9:05. A. Ramage.

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.

**[221 Introduction to Art History: Minoan-Mycenaean Art and Archaeology (also Classics 221)]** 3 credits. Not offered 1983-84.]

**[230 Introduction to Art History: Monuments of Medieval Art]** 3 credits. Not offered 1983-84. R. G. Calkins.]

**240 Introduction to Art History: The Renaissance** Fall. 3 credits.

M W F 9:05; one disc, M 1:25, T 9:05 or 11:15, or W 1:25. E. G. Dotson.

A study of selected works of architecture, sculpture, and painting in Italy and northern Europe from about 1300 to about 1575. Major artists considered include Donatello, Jan van Eyck, Michelangelo, and Bruegel. Various approaches to the understanding of works of art and various interpretations of the Renaissance are explored.

**250 Introduction to Art History: The Baroque Era** Spring. 3 credits.

M W F 10:10. Staff.

A survey of the art and architecture of Italy, France, Spain, Holland, and Flanders in the seventeenth century. A few artists such as Bernini, Rembrandt, and Velazquez will be emphasized and placed within the context of the major trends and ideas of the time. In addition to distinguishing artistic styles and aesthetic concerns, the course will consider other cultural factors shaping the work of art, such as patronage, religion, politics, and economics.

**261 Introduction to Art History: Modern Art** Fall. 3 credits.

T R 10:10-11:25. L. L. Meixner.

A topical discussion of some of the major artists, movements, and ideas that make up modern art. Emphasis is on European and American painting of the nineteenth and twentieth centuries.

**270 Introduction to Art History: American Art** Spring. 3 credits.

M W 9:05, plus one disc. T. W. Leavitt.

American art from colonial times through the first half of the twentieth century. Emphasis on American painting and sculpture in the early twentieth century.

**280 Introduction to Art History: Asian Traditions** Spring. 3 credits.

M W F 11:15. S. J. O'Connor.

Designed to introduce students to the varied responses of the Asian artist in different social and geographical contexts. By selective focus and emphasis rather than broad survey, the student will gain some familiarity with the Javanese shadow-puppet theatre, high-fired ceramics, Chinese landscape painting, Buddhist sculpture and painting of Thailand, Indian miniature paintings, and Japanese prints. A number of class sessions will meet in the Herbert F. Johnson Museum of Art.

**290 Introduction to Art History: Architecture and Environment** Spring. 3 credits. Limited to 50 students.

M W F 12:20. T. M. Brown.

Emphasis is placed on the social and humanistic aspects of nineteenth- and twentieth-century design. After a lengthy introduction to the architectural categories of space, form, function, and structure, the ideas and forms that have influenced the physical shape of the contemporary world are considered. Participants are expected to read one book per week, to be discussed on Fridays.

### Intermediate Courses

The following courses are intended primarily for upperclass students, qualified sophomores, and first-year graduate students. Except as noted, all require as a general prerequisite one course at the 200 level. Some of the courses have discussion sections.

**311 Techniques and Materials: Painting** Spring. 4 credits. Limited to 30 students.

T R 10:10-12:05. H. P. Kahn.

The techniques of painting in their historical and formal contexts; analytical research of materials and conservation.

**313 Books, Prints, and the Graphic Image** Fall. 4 credits. Limited to 30 students.

T R 10:10-12:05. H. P. Kahn.

The history and formal evolution of letters, types, illustrations, books, and publications; theories of design and message.



**[320 The Archaeology of Classical Greece (also Classics 320)]** 4 credits. Not offered 1983–84.  
A. Ramage.]

**[321 The Archaeology of Cyprus (also Classics 321)]** 4 credits. Not offered 1983–84.]

**[322 Arts of the Roman Empire (also Classics 350)]** 4 credits. Not offered 1983–84.  
A. Ramage.]

**323 Painting in the Greek and Roman World (also Classics 323)** Spring. 4 credits.  
M W F 2:30. A. Ramage.  
Vase painting, wall painting, and mosaics from the ancient Mediterranean world will be studied in conjunction with the testimony of Greek and Roman sources. An attempt will be made to grasp the concerns and achievements of the Classical painters.

**[324 Architecture in the Greek and Roman World (also Classics 324)]** 4 credits. Not offered 1983–84.]

**[325 Greek Vase Painting (also Classics 325)]** 4 credits. Not offered 1983–84.  
A. Ramage.]

**[326 Art and Archaeology of Archaic Greece (also Classics 326)]** 4 credits. Not offered 1983–84.]

**327 Greek and Roman Coins (also Classics 327)** Fall. 4 credits.  
M W F 2:30. A. Ramage.  
The varied issues of Greek cities and the Roman state are examined. Coins are considered as art objects as well as economic and historical documents. The changes in design, value, and metals from the origins of coinage to the Late Roman period are studied. Lectures, student presentations, work with actual examples.

**[328 Greeks and Their Eastern Neighbors (also Classics 322)]** 4 credits. Not offered 1983–84.  
J. Coleman.]

**[329 Greek Sculpture (also Classics 329)]** 4 credits. Not offered 1983–84.  
A. Ramage.]

**[330 Art in Pompeii: Origins and Echoes (also Classics 330)]** 4 credits. Not offered 1983–84.]

**332 Architecture in the Middle Ages (also Architecture 382)** Spring. 4 credits.  
M W F 9:05. R. G. Calkins.  
A survey of medieval architecture from the Early Christian period to the Late Gothic (A.D. 300–1500). Considerable emphasis will be placed on the development of structural systems and upon the form, function, and meaning of important medieval buildings.

**333 Early Medieval Art and Architecture** Fall. 4 credits.  
M W F 11:15. R. G. Calkins.  
Sculpture, painting, and architecture in the periods from the late antique through the Carolingian era (A.D. 300–900). The evolution of the Byzantine tradition will also be considered.

**[334 Romanesque Art and Architecture]** 4 credits. Not offered 1983–84.  
R. G. Calkins.]

**[335 Gothic Art and Architecture]** 4 credits. Not offered 1983–84.  
R. G. Calkins.]

**[336 Late Medieval Italian Art and Architecture]** 4 credits. Not offered 1983–84.  
R. G. Calkins.]

**[337 The Medieval Illuminated Book]** 4 credits. Not offered 1983–84.  
R. G. Calkins.]

**[341 Flemish Painting]** 4 credits. Not offered 1983–84.  
R. G. Calkins.]

**342 Medieval and German Renaissance Art** Spring. 4 credits.  
M W F 12:20. R. G. Calkins.  
A study of the German contribution in architecture, panel painting, graphic art, and sculpture in the fourteenth, fifteenth, and sixteenth centuries. Emphasis is on the art of Bohemia and the works of Meister Bertram, Riemenschneider, Schongauer, Dürer, Grünewald, Baldung Grien, Cranach, and Holbein.

**[343 Italian Renaissance Art of the Fifteenth Century]** 4 credits. Not offered 1983–84.]

**[344 Italian Renaissance of the Sixteenth Century]** 4 credits. Not offered 1983–84.  
C. Lazzaro.]

**[345 Sculpture of the Italian Renaissance]** 4 credits. Not offered 1983–84.]

**[350 The Culture of the Early Renaissance (also History 361 and Comparative Literature 361)]** 4 credits. Not offered 1983–84.  
C. Lazzaro, J. Najemy.]

**[351 Introduction to the Culture of the Later Renaissance (also History 364 and Comparative Literature 362)]** 4 credits. Not offered 1983–84.  
E. G. Dotson, C. Kaske.]

**[352 Dutch Painting in the Seventeenth Century]** 4 credits. Not offered 1983–84.  
C. Lazzaro.]

**[355 French Art of the Sixteenth and Seventeenth Centuries]** 4 credits. Not offered 1983–84.  
E. G. Dotson.]

**357 European Art of the Eighteenth Century** Fall. 4 credits.  
M W F 11:15. E. G. Dotson.  
A study of tradition, change, and revolution in the architecture, painting, sculpture, and minor arts of eighteenth-century Europe. The course will be organized around a selected sequence of European centers where the various styles underwent an especially brilliant, original, or influential development, and an effort will be made to relate these developments to the cultural background of the period of these centers.

**[359 Major Masters of the Graphic Arts]** 4 credits. Not offered 1983–84.  
H. P. Kahn, C. Lazzaro.]

**[361 Modern Artists and Their Critics]** 4 credits. Not offered 1983–84.]

**362 Topics in Modern Art** Spring. 4 credits.  
M W F 1:25. L. L. Meixner.  
Topic for spring 1984 to be announced.

**[364 Modern Sculpture]** 4 credits. Not offered 1983–84.]

**365 Art from 1940 to the Present** Fall. 4 credits.  
T R 8:40–9:55.  
Major movements and figures working in the United States since 1940, beginning with abstract expressionism and continuing to conceptual art, feminist art, and neo-expressionist art. Some attention is devoted to the critical reception that artists have received but, major emphasis is on the artists' statements themselves.

**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.  
Scott.  
An 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 urban-scape of the nation's capital. The vocabulary of architectural analysis and criticism will be taught. Field trips required.

**[376 Painting and Sculpture in America: 1850–1950]** 4 credits. Not offered 1983–84.  
T. W. Leavitt.]

**378 American Architecture, the City, and American Thought: 1850–1950** Spring. 4 credits.  
T R 12:20–1:35. T. M. Brown.  
American architecture and urbanism approached as cultural history, focusing on such topics as "technology: pro and con," "architecture as metaphor," and "cities: source of virtue or vice?" Extensive reading will be required from works of Thoreau, Greenough, Sullivan, and Wright, and from secondary sources such as Leo Marx's *The Machine in the Garden* and M. and L. White's *The Intellectual versus the City*. Some background in American history is assumed.

**[379 Art and Technology: 1850–1950]** 4 credits. Not offered 1983–84.  
T. M. Brown.]

**380 Introduction to the Arts of China** Fall. 4 credits.  
M W 12:20; disc to be arranged. M. W. Young.  
A one-semester course designed for those students who have had no previous experience in art history or knowledge of China. Although the course has a general chronological framework, it is not a survey of Chinese art but an examination of selected masterpieces of Chinese expression in the visual arts, from ancient bronze vessels to modern landscape paintings. Special emphasis will be put on the art of the later centuries, and the course will end with a discussion of art in contemporary China. The collection of the Herbert F. Johnson Museum of Art will be used in conjunction with written assignments.

**[381 Buddhist Art in Asia]** 4 credits. Not offered 1983–84.  
S. J. O'Connor.]

**[383 The Arts of Early China]** 4 credits. Not offered 1983–84.  
M. W. Young.]

**384 The Arts of Japan** Spring. 4 credits.  
M W 12:20; disc to be arranged. M. W. Young.  
A general overview of the arts of Japan, intended to introduce the student to 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 postmedieval period. The tea ceremony, ceramics, and the minor arts will receive particular 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 detailed discussion of the wood-block prints of the nineteenth century. The museum collection will be used for written assignments.

**[385 Chinese Painting]** 4 credits. Not offered 1983–84.  
M. W. Young.]

**[386 Studies in Indian and Southeast Asian Art]** 4 credits. Not offered 1983–84.  
S. J. O'Connor.]

## Seminars

Courses at the 400 level are open to upperclass students, majors, and graduate students. Seminars at the 500 level are primarily for graduate students, but qualified upperclass students may be admitted. All seminars involve the writing and presentation of research papers. Enrollment is limited, and permission of the department or instructor is normally required. Students may repeat 500-level courses that cover a different topic each semester.

**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.

**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.

**[405 Original Works of Art** 4 credits. Not offered 1983–84.]

**[406 Introduction to Museums** 2 credits. Not offered 1983–84.  
T. W. Leavitt.]

**[421 History of Art Criticism** 4 credits. Not offered 1983–84.]

**[423 Ceramics** 4 credits. Not offered 1983–84.  
A. Ramage.]

**[431 Greek Sculpture (also Classics 431)** 4 credits. Not offered 1983–84.  
A. Ramage.]

**437 The Medieval Illuminated Book** Fall. 4 credits.  
R 2:30–4:30. R. G. Calkins.  
A study of selected major types and examples of medieval illuminated manuscripts from A.D. 300 and 1500. Facsimiles and actual manuscripts are examined.

**[448 Mannerism and the Early Baroque Era in Italy** 4 credits. Not offered 1983–84.  
E. G. Dotson.]

**[449 Studies in Italian Renaissance Art** 4 credits. Not offered 1983–84.  
C. Lazzaro.]

**[452 Studies in English Art** 4 credits. Not offered 1983–84.]

**454 The Art and Poetry of William Blake (also English 448)** Spring. 4 credits.  
T R 2:30–3:45. J. Visconti.  
An examination of the complete Blake: printmaker, painter, and poet. Special attention will be paid to the illuminated books, color-print drawings, and tempera paintings, and the techniques by which they were made.

**[456 Literature and the Arts in Sixteenth-Century France (also French 456)** 4 credits. Not offered 1983–84.  
E. G. Dotson, E. P. Morris.]

**[458 Classic and Romantic Art** 4 credits. Not offered 1983–84.  
E. G. Dotson.]

**459 The Romantic Movement in Poetry, Painting, and Graphic Arts (also English 442)** Fall. 4 credits.  
T 2:30–4:30. J. Visconti.

In this course we will examine the works of English Romantic poets and artists whose experiments with media have significantly changed our understanding of art. Works include the art and literature of the picturesque; watercolor paintings by Sandby, Cozens, and Turner; prints by Blake, Gainsborough, and Rowlandson; and lyrical poetry of Wordsworth, Coleridge, Shelley, and Keats. The similarities among these diverse arts, both in technique and theme, will be discussed, as well as the Romantic's attempts to redefine the value of art and the role of the artist in society.

**[464 Studies in Modern Art** 4 credits. Not offered 1983–84.]

**465 Problems in Modern Art and Architecture** Spring. 4 credits. Limited to 15 students. Prerequisite: permission of instructor.

R 2:30–4:30. T. M. Brown.  
Topic for 1984: Modernism. Analyses and comparisons of modernism as expressed in industrial, literary, and artistic areas. Weekly readings of a variety of works, including Orwell's *1984*, Huxley's *Brave New World*, Freud's *Civilization and Its Discontents*, and Le Corbusier's *Towards a New Architecture* can be expected.

**[474 American and European Decorative Arts from the Renaissance Period to the Early Nineteenth Century** 4 credits. Not offered 1983–84.  
A. S. Roe.]

**475 The Earliest Arts in Colonial America: The Seventeenth Century** Fall. 4 credits.  
T R 12:20–2:15. A. S. Roe.  
An amplification of History of Art 474, this course will deal only with the arts in New England and the Hudson River Valley prior to 1700. Under consideration will be the earliest objects surviving, which were demonstrably produced in the Colonies during this period, and also those types of objects produced in England and elsewhere, which are known to have been imported in significant quantities from the earliest times. The traditions of craftsmanship prevailing in Europe at the time of the arrival of the first settlers in New England will be studied as indicative of the stylistic origins that determined the form and decoration of the earliest objects produced in America. In addition to furniture, particular emphasis will be placed upon the art of the silversmith, the first highly sophisticated European craft to be developed in the New World and important not only as the art form that most rapidly transmitted to America the latest stylistic developments in the arts of Europe but also for its economic significance in the days when silver was the major medium of exchange and the silversmith performed many of the functions today associated with the banker. The early importation of ceramics, both high style and utilitarian, will also be considered.

**[476 Seminar on American Art: 1840–1940** 4 credits. Not offered 1983–84.  
T. W. Leavitt.]

**[481 The Arts in Modern China** 4 credits. Not offered 1983–84.  
M. W. Young.]

**[482 Ceramic Art of Asia** 4 credits. Not offered 1983–84.  
J. O'Connor.]

**[483 Chinese Art of the T'ang Dynasty** 4 credits. Not offered 1983–84.  
M. W. Young.]

**486 Studies in Chinese Painting** Spring. 4 credits. Prerequisite: History of Art 380 or permission of instructor.  
R 2:30–4:30. M. W. Young.

Topic for 1984: Expressionism in later Chinese painting. A detailed consideration of the individualist and eccentrics of the seventeenth and eighteenth centuries and the role of expression in paintings of the nineteenth and twentieth centuries. Conducted as an undergraduate seminar, with discussion and individual presentations by participants.

**[488 Traditional Arts of Southeast Asia** 4 credits. Not offered 1983–84.  
J. O'Connor.]

**493 Honors Work** Fall or spring. 4 credits.  
Intended for senior art history majors who have been admitted to the honors program. S-U grades only.  
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.

**494 Honors Work** Fall or spring. 4 credits.  
Prerequisite: History of Art 493.

Hours to be arranged. Staff.  
The student, under faculty direction, will prepare a senior thesis.

**[520 The Empire in Transition** 4 credits. Not offered 1983–84.  
A. Ramage.]

**[531 Problems in Medieval Art and Architecture** 4 credits. Not offered 1983–84.  
R. G. Calkins.]

**540 Seminar in Renaissance Art** Spring. 4 credits.  
M 2:30–4:30. E. G. Dotson.  
Topic for 1984: Relationships between Italy and northern Europe between 1300 and 1550. Problems of cultural leadership and interchange, artistic influence and its channels during a period of rapid cultural change.

**[550 Seminar in Baroque Art** 4 credits. Not offered 1983–84.  
C. Lazzaro.]

**[564 Problems in Modern Art: Post-1940 American Art** 4 credits. Not offered 1983–84.  
R. C. Hobbs.]

**580 Problems in Asian Art** Spring. 4 credits.  
Prerequisite: permission of instructor.  
W 2:30–4:30. S. J. O'Connor.  
Topic for 1984: Critical review of selected works on earlier Southeast Asian art.

**591–592 Supervised Reading** 591, fall; 592, spring. 4 credits. May be repeated for credit. Limited to graduate students.  
Staff.

**[594 Methodology Seminar I** 4 credits. Not offered 1983–84.]

**[595 Methodology Seminar II** 4 credits. Not offered 1983–84.  
R. G. Calkins.]

**[596 Problems in Art Criticism** 4 credits. Not offered 1983–84.  
S. J. O'Connor.]

## Related Courses in Other Departments

**The Poetics of Modernism in Literature and Art: Paris, New York, Tel Aviv (Near Eastern Studies 402 and Comparative Literature 402)** Spring.

**Figurative Arts of Antiquity in the Renaissance (Society for the Humanities 414)** Spring.

See courses listed under Classics.

## Indonesian

See Modern Languages, Literatures, and Linguistics, p. 159.

### FALCON Program:

J. U. Wolff, 307 Morrill Hall, 256-4864.

## Italian

See Modern Languages, Literatures, and Linguistics, p. 159.

## Japanese

See Department of Asian Studies, p. 109, and Modern Languages, Literatures, and Linguistics, p. 160.

### FALCON Program:

E. Jorden, 321 Morrill Hall, 256-6457.

## Javanese

See Modern Languages, Literatures, and Linguistics, p. 161.

## Latin

See Department of Classics, p. 118.

## Linguistics

J. W. Gair, director of undergraduate studies (407 Morrill Hall, 256-5110).

See Modern Languages, Literatures, and Linguistics, p. 161.

## Mathematics

A. Nerode, chairman; I. Berstein, L. Billera, J. Bramble, associate chairman and director of undergraduate studies (301 White Hall, 256-4185), K. Brown, L. Brown, S. Chase, M. Cohen, R. Connelly, R. Dennis, E. Dynkin, C. Earle, R. Farrell, P. Fejer, M. Fisher, W. Fuchs, S. Gelbart, L. Gross, R. Hamilton, A. Hatcher, D. Henderson, J. Hubbard, J. Hwang, P. Kahn, H. Kesten, A. Knapp, S. Lichtenbaum, G. Livesay, T. McConnell, M. Morley, L. Payne, R. Platek, A. Rosenberg, O. Rothaus, A. Schatz, S. Sen, R. Shore, B. Speh, F. Spitzer, R. Strichartz, M. Sweedler, L. Wahlbin, J. West, A. C. Zitronenbaum

Mathematics is the language of modern science; basic training in the discipline is essential for those who wish to understand, as well as for those who wish 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 wish 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, final 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 in the front section of this Announcement, p. 12.

### 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, 192, and, in 1983–84, in 217. (Students with two semesters of advanced placement usually have had the equivalent of 217.) 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 214–215–216–217–218–231, 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, 421, 422, 423, 418.
- 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 314 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) Mathematics 305 (not offered every year).
  - b) Physics 208, 213, or 217.
  - c) Computer Science 211, provided no Computer Science course has been used toward satisfying the previous requirement.
  - d) 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.

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, 321, 410, 414, 481.

Requirement 5 is met by Computer Science 481 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 program because they provide better preparation for 411.

#### For Prelaw or Premed (second example) or Prebusiness

First two years: Mathematics 111–112–214–215–216–218–231, Computer Science 100–211.

Last two years: Mathematics 332–336, two of 411–421–418, and also 381, 403, 451.

A course in statistics is also strongly recommended.

**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.

## Distribution Requirement

The distribution requirement is satisfied in mathematics by any 6 credits, not including more than one course from Mathematics 105, 107, 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 107 or 105 or, if they need more calculus, 111 or 113. They may not, however, receive credit for both ALS 115 and Mathematics 108.

### Calculus

Description	Mathematics Course Numbers
1) Standard 3-semester sequence for students who do not expect to take advanced courses in mathematics	111 (or 113)–112–214–215–216–218
2) Usual sequence for prospective mathematics majors and others who expect to take advanced courses in mathematics	111 (or 113)–122–221–222
3) Calculus for engineers (also taken by some physical science majors)	191 (or 193)–192–293–294

Mathematics 191 (or 193) may be substituted for 111 (or 113) in sequences 1 and 2. Mathematics 113 and 193 are variants of 111 and 191 for students who have had some calculus in high school but have not received advanced placement. 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, but 217 must then be taken concurrently.

### Special Purpose Sequences

Description	Mathematics Course Numbers
1) Finite mathematics and calculus for biology majors	105–106
2) Finite mathematics and calculus for students in the more descriptive areas of the social sciences. (This is normally a	107–108

terminal sequence. It does not fulfill the mathematics requirement for biology majors.)

- |   |                            |
|---|----------------------------|
| 3) Other possible finite mathematics and calculus sequences | 105–111 or 107–111         |
| 4) One semester of calculus                                 | 108 (possible without 107) |

Students who wish 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, or, in exceptional circumstances (with consent of the instructor), with 214–218. Although 108 is normally a terminal course, students who do extremely well in it may take 112.

*Switching between calculus sequences is often difficult, especially at the 200-level. Students should not attempt such a switch without consulting the associate chairman.*

## 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.*

105 and 107	
108 and ALS 115 (College of Agriculture and Life Sciences)	
106, 108, 111, 113, 191, 193	218 and 293
112, 122, and 192	221 and 214
112 and 217	221 and 216
192 and 217	222 and 216
214 and 293	217 and 122
216 and 192	221, 294, and 231
216 and 294	372 and 472

## Basic Sequences

### 103 Mathematics for Architects (also Architecture 221)

Fall. 3 credits.  
Lec, T 10:10, plus 2 recs to be arranged.  
Rudiments of calculus and introduction to vectors and matrices.

### 105 Finite Mathematics for Biologists (also Theoretical and Applied Mechanics 105)

Fall. 3 credits. Prerequisite: three years of high school mathematics, including trigonometry and logarithms.\*  
Lecs, T R 12:20, plus 2 hours to be arranged.  
Prelims: 7:30 p.m., Oct. 4, Nov. 8, Dec. 1.  
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.

### 106 Calculus for Biologists (also Theoretical and Applied Mechanics 106)

Spring. 3 credits.  
Prerequisite: Mathematics 105 or 109 or ALS 115 or consent of instructor. (A strong background in functions is required.) Mathematics 111, rather than 106, is recommended for those planning to take 112.\*

Lecs, T R 11:15, plus 2 hours to be arranged.  
Prelims: 7:30 p.m., dates to be announced.  
Introduction to differential and integral calculus, partial derivatives, elementary differential equations. Examples from biology are used.

### 107 Finite Mathematics

Fall or summer. 3 credits. Prerequisite: three years of high school mathematics, including at least two years of high school algebra. This course cannot be used toward fulfillment of the mathematics requirement for biology majors.\*

\*See the list of courses with overlapping content at the end of the introduction.

Lecs, T R 12:20, plus 2 hours to be arranged.  
Prelims: 7:30 p.m., Sept. 22, Oct. 27, Nov. 29.  
Functions, enumeration, permutations and combinations, probability, vectors and matrices, Markov chains.

### 108 Introduction to Calculus

Spring. 3 credits.  
Intended primarily for students in the more descriptive areas of the social sciences. Prerequisite: three years of high school mathematics, including trigonometry and analytic geometry of the line and circle. Recommended: Mathematics 107. This course does not normally provide adequate preparation for any higher course in mathematics, nor can it be used toward fulfillment of the mathematics requirement for biology majors.\*

Lecs, T R 12:20 plus 2 hours to be arranged.

Prelims: 7:30 p.m., dates to be announced.

Behavior of functions, introduction to differential and integral calculus, elementary differential equations.

### 109 Precalculus Mathematics

Fall or summer. 3 transcript credits only; cannot be used toward graduation.  
M W F 11:15.  
This course is designed to prepare students for Mathematics 111 or 108. Algebra, trigonometry, logarithms, and exponentials are reviewed.

### 111 Calculus

Fall, spring, or summer. 4 credits.  
Intended for students who have a good background in high school mathematics but who have not studied calculus (see Mathematics 113). Prerequisite: Mathematics 109 or three years of high school mathematics, including trigonometry.\*  
Fall: lec, M W F 12:20, plus 2 hours to be arranged. Spring: lec, M W F 11:15, plus 2 hours to be arranged. Prelims: fall, 7:30 p.m., Oct. 6, Nov. 3, Dec. 1; spring, 7:30 p.m., dates to be announced.

Plane analytic geometry, differentiation and integration of algebraic and trigonometric functions, applications of differentiation, logarithmic and exponential functions.

### 112 Calculus

Fall, spring, or summer. 4 credits.  
Prerequisites: Mathematics 106 or 111 or 113 with a grade of C or better, or exceptional performance in 108. Those who do extremely well in Mathematics 111 or 113 should take 122 instead of 112, unless they plan to continue with 214–218.\*  
Fall: lec, M W F 11:15, plus 2 hours to be arranged. Spring: lec, M W F 10:10, 11:15, 12:20, plus 2 hours to be arranged. Prelims: fall, 7:30 p.m., Oct. 6, Nov. 3, Dec. 1; spring, 7:30 p.m., dates to be announced.

Applications of integration, methods of integration, plane curves and polar coordinates, vectors and solid analytic geometry, infinite series, complex numbers, introduction to partial derivatives.

### 113 Calculus

Fall. 4 credits. Prerequisite: Mathematics 109 or three years of high school mathematics, including trigonometry. This course covers the same material as Mathematics 111, but it is intended for students who have had enough calculus to be able to differentiate polynomial functions.\*  
Lecs, M W F 11:15 or 12:20, plus 2 hours to be arranged. Prelims: 7:30 p.m., Oct. 6, Nov. 3, Dec. 1.

### 122 Calculus

Fall or spring. 4 credits. Prerequisite: performance at a high level in Mathematics 111 or 113 or permission of the department. Students planning to continue with Mathematics 214–218 are advised to take 112 instead of this course.\*  
Fall: M W F 10:10, 11:15, or 12:20. Spring: M W F 9:05 or 10:10.  
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.

**191–193 Calculus for Engineers** Fall, 4 credits. Prerequisite: three years of high school mathematics, including trigonometry. Mathematics 193 is a course parallel to 191 for students who have had a substantial amount of calculus in high school but who did not place out of 191. Although the same topics will be covered in Mathematics 193 as in 191, some may be treated in greater depth in 193.\*

191: lecs, M W F 11:15, plus 2 hours to be arranged. 193: lecs, M W F 9:05 or 11:15, plus 2 hours to be arranged. Prelims: 7:30 p.m., Oct. 6, Nov. 3, Dec. 1.

Plane analytic geometry, differential and integral calculus, and applications.

**192 Calculus for Engineers** Fall, spring, or summer. 4 credits. Prerequisite: Mathematics 191 or 193.\*

Fall: lecs, M W F 9:05 or 11:15, plus 2 hours to be arranged. Spring: lecs, M W F 9:05 or 11:15, plus 2 hours to be arranged. Prelims: fall, 7:30 p.m., Oct. 6, Nov. 3, Dec. 1; spring, 7:30 p.m., dates to be announced.

Methods of integration, polar coordinates, vectors and parametric equations, vector functions of one variable, infinite series, complex numbers, introduction to partial derivatives.

**213 Calculus** Summer

This course covers the same material as 214–215–216–218.

**214–215–216–218** Fall or spring: 1 credit each. Prerequisite: Mathematics 112 or 122. These courses are taught as a unified third-semester calculus package, but students may register for any subset of these courses in accordance with their interests and needs, subject to the credit regulations explained at the end of the introduction. Students in doubt about their choices should consult their advisers and the course instructors. The courses are offered in sequence (though not necessarily in numerical order) through the semester, and each lasts three to four weeks. The expected order is Mathematics 218 and 216 preceding 214 and 215, but some variation is possible. *Note:* Infinite series and complex numbers are prerequisites to Mathematics 214 and 215.

Lecs, M W F 10:10, plus 2 hours to be arranged. All students should attend the first lecture of the semester to learn the order in which the course will be taught, the dates for each course, the examination dates, and the structure of the whole. Prelims will be given some evenings at 7:30 p.m.

**214 Introduction to Differential Equations**

Prerequisite: Infinite series—that is, Mathematics 217 or equivalent material from Mathematics 112 or 122. Simple first- and second-order equations with applications; series solutions. See also the entire 214–215–216–218 description above.

**215 Differential Equations (Continued)**

Prerequisites: Mathematics 214 or equivalent material from Mathematics 112, 122, or 293. Introduction to numerical methods of solution, systems of differential equations, elementary partial differential equations, and boundary value problems. Applications. See also the entire 214–215–216–218 description above.

**216 Vector Analysis**

Vectors, vector valued functions, line integrals. See also the entire 214–215–216–218 description above.

**218 Multivariable Calculus**

See the entire 214–215–216–218 description above.

**Note: 217 Infinite Series and Complex**

**Numbers** Fall or spring, 1 credit. In 1983–84, Mathematics 217 will be offered for students who took 112 before fall 1982 or who have otherwise missed infinite series. It will be taught during the first four weeks of the semester, M W F 8.

**221 Linear Algebra and Calculus** Fall or spring 4 credits. Prerequisite: Mathematics 122 with a grade of B or better, or permission of instructor. Students who obtain permission to use Mathematics 112, taken before fall 1982, as prerequisite should take 217 and 221 concurrently.\*

Fall: M W F 9:05, 10:10, or 11:15. Spring M W F 10:10 or 11:15.

Linear algebra and differential equations. Topics include vector algebra, linear transformations, matrices, linear differential equations, as well as an introduction to proving theorems.

**222 Calculus** Fall or spring, 4 credits. Prerequisite: Mathematics 221.

Fall: M W F 11:15 or 12:20. Spring: M W F 9:05 or 10:10 or 11:15.

Vector differential calculus, calculus of functions of several variables, multiple integrals.

**293 Engineering Mathematics** Fall or spring.

3 credits. Prerequisites: Mathematics 192 or 194, plus a knowledge of computer programming equivalent to that taught in Engineering Common Courses 105. In exceptional circumstances, Mathematics 192 and 293 may be taken concurrently.\*

Fall: lecs, M W 10:10, 11:15, or 12:20, plus one hour to be arranged. Spring: lecs, M W 10:10 or 12:20, plus one hour to be arranged. Prelims: fall, 7:30 p.m., Sept. 29, Nov. 3, Dec. 1; spring, 7:30 p.m., dates to be announced.

Partial derivatives, multiple integrals, first- and second-order ordinary differential equations with applications in the physical and engineering sciences.

**294 Engineering Mathematics** Fall, spring, or summer. 4 credits. Prerequisite: Mathematics 293.\*

Fall: lecs, M W F 10:10 or 12:20, plus one hour to be arranged. Spring: lecs, M W F 10:10, 11:15, or 12:20, plus one hour to be arranged. Prelims: fall, 7:30 p.m., Sept. 29, Nov. 3, Dec. 1; spring 7:30 p.m., dates to be announced.

Vector spaces and linear algebra, matrices, eigenvalue problems and applications to systems of linear differential equations. Vector calculus. Boundary value problems and introduction to Fourier series.

## General Courses

Students who want a general introductory mathematics course are advised to take Mathematics 107–108, described above.

**401 Honors Seminar** Fall or spring, 4 credits.

Prerequisite: permission of instructor. Students will discuss selected topics under the guidance of one or more members of the staff.

**[403 History of Mathematics** Spring, 4 credits.

Prerequisite: one term of calculus and permission of instructor. Not offered 1983–84.

T R 10:10–11:25.

Topics in mathematics from antiquity to the present.]

**690 Supervised Reading and Research** Variable credit (up to 6 credits each term).

## Applied Mathematics and Differential Equations

**421 Applicable Mathematics** Fall, spring, or summer. 4 credits. Prerequisites: high level of performance in Mathematics 294, or 221 and 222, or 214–218 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. Students who have not had infinite series, some linear algebra, and some ordinary differential equations should take Mathematics 214–218, 217, 231, and then 421–422–423.

T W R F 12:20. Evening prelims may be scheduled. 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.

**422 Applicable Mathematics** Spring or summer 4 credits. Prerequisite: Mathematics 421.

T W R F 12:20. Evening prelims may be scheduled. Complex variables. Fourier transforms, Laplace transforms. An introduction to generalized functions. Applications to partial differential equations.

**423 Applicable Mathematics** Fall 4 credits.

Prerequisite: Mathematics 421; however, students who have not taken 422 should talk to the instructor before taking this course.

T W R F 12:20.

Normed vector spaces. Elementary Hilbert space theory. Projections. Fredholm's alternative. Eigenfunction expansions. Applications to elliptic partial differential equations and to integral equations.

**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.

M W F 11:15.

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.

**[427 Introduction to Ordinary Differential Equations** Fall, 4 credits. Prerequisite: Mathematics

222 or 294, or permission of instructor. Not offered 1983–84.

T R 10:10–11:25.

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.]

**428 Introduction to Partial Differential Equations**

Spring, 4 credits. Prerequisite: Mathematics 222 or 294 or permission of instructor.

T R 10:10–11:25.

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.

## Analysis

**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.

T R 8:40–9:55.

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.

\*See the list of courses with overlapping content at the end of the introduction.



**413–414 Introduction to Analysis** 413, fall; 414, spring. 4 credits each. Prerequisite: Mathematics 222.

T R 10:10–11:25.

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.

**418 Introduction to the Theory of Functions of One Complex Variable** Spring. 4 credits.

Prerequisite: Mathematics 222 or 294 or 214–218. May be offered only in alternate years.

T R 1:25–2:40.

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.

## Algebra

**231 Linear Algebra** Spring or summer. 3 credits. Prerequisite: one year of calculus.\*

M W F 10:10.

Vectors, matrices, and linear transformations, affine and Euclidean spaces, transformation of matrices, and eigenvalues.

**332 Algebra and Number Theory** Fall only.

4 credits. Prerequisite: 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.

M W F 9:05.

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.

**336 Applicable Algebra** Spring. 4 credits.

Prerequisites: Mathematics 221, or 294, or 231.

M W F 9:05.

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 of 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.

**431–432 Introduction to Algebra** 431, fall; 432, spring. 4 credits each. Prerequisite: Mathematics 221 or 231. Undergraduates who plan to attend graduate school in mathematics should take 433–434.

M W F 10:10.

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.

**433–434 Introduction to Algebra** 433, fall; 434, spring. 4 credits each. Prerequisite: Mathematics 221 or 231.

M W F 10:10.

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.

\*See the list of courses with overlapping content at the end of the introduction.

## Geometry and Topology

**451–452 Classical Geometries** 451, fall or summer; 452, spring. 4 credits each term.

Prerequisite: Mathematics 221 or 231 or permission of instructor.

M W F 11:15.

Foundations of geometry. Various geometric topics, including Euclidean, non-Euclidean, and projective geometry and rigidity theory.

**453 Introduction to Topology** Fall. 4 credits.

Prerequisites: Mathematics 411 and 221, or permission of instructor.

M W F 12:20.

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.

**454 Introduction to Differential Geometry**

Spring. 4 credits. Prerequisite: Mathematics 222 or 294. Mathematics 453 is not a prerequisite.

M W F 12:20.

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 may be indicated.

## Probability and Statistics

**372 Elementary Statistics** Fall. 4 credits.

Prerequisites: one year of calculus; also Computer Science 100, or 101, or 108, or permission of instructor. A terminal course for students who will take no further courses in statistics.\*

M W F 9:05. Evening prelims may be given.

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.

**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.

Lecs, M W F 11:15; rec, R 12:20. Evening prelims may be given.

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.

**472 Statistics** Spring. 4 credits. Prerequisite: Mathematics 471 and knowledge of linear algebra such as taught in Mathematics 221.\*

M W F 11:15. Evening prelims may be given.

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.

**[473 Further Topics in Statistics]** 4 credits.

Prerequisite: Mathematics 472 or 574. Not offered 1983–84.

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.]

## Mathematical Logic

**381 Elementary Mathematical Logic** Spring. 4 credits. Prerequisite: Mathematics 122.

M W F 11:15.

Propositional and predicate logic. Completeness and incompleteness theorems. Set theory.

## 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.

**503 History of Mathematics** Spring. 4 credits.

Prerequisites: Mathematics 511 and 531. Intended for graduate students in the mathematical sciences. May not be offered 1983–84.

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.

**511–512 Real and Complex Analysis** 511, fall; 512, spring. 511: measure and integration, functional analysis. 512: complex analysis, Fourier analysis, and distribution theory.

**513–514 Topics in Analysis**

**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.

T W R F 12:20.

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.

**517–518 Ordinary Differential Equations** Basic theory of ordinary differential equations.

**[519–520 Partial Differential Equations]** Not offered 1983–84.]

**521 Measure Theory and Lebesgue Integration** Fall.

Measure theory, integration, and  $L_p$  spaces.

**522 Applied Functional Analysis** Spring.

Spectral theorem for bounded operators, spectral theory for unbounded operators in Hilbert space, compact operators, distributions. Applications.

**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.

**537 Elementary Number Theory** Fall. Prerequisites: Mathematics 432 and 412. Introduction to number theory suitable for first-year graduate students and advanced undergraduates. Choice of topics discussed depends on the instructor. In previous years the text has been *A Course in Arithmetic*, by J. P. Serre; the topics covered have included quadratic forms, quadratic reciprocity, and modular forms.

**549–550 Lie Groups and Differential Geometry.** May not be offered 1983–84.

**551 Introductory Algebraic Topology** Spring. Fundamental group and covering spaces. Homology theories for complexes and spaces.

**552 Differentiable Manifolds** Fall. Prerequisites: advanced calculus and some elementary point-set topology (e.g., knowledge of the concepts of continuity, compactness, and connectedness). This course will be an introduction to differential topology, intended for undergraduate seniors and beginning graduate students. The first part of the course will emphasize examples and constructions of manifolds. Topics will include  $C^r$  and analytic structures, non-smooth manifolds, immersions and imbeddings, tangent bundles, tubular neighborhoods, transversality, cobordism, vector fields and dynamical systems, foliations.

**[561 Geometric Topology** Not offered 1983–84. Topics from general topology. Introduction to geometric properties of manifolds.]

**571–572 Probability Theory** Prerequisites: 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.

**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.

**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.

**[575 Sequential Analysis, Multiple Decision Problems** Not offered 1983–84.]

**[577 Nonparametric Statistics** Prerequisite: a course in mathematical statistics such as Mathematics 574. Not offered 1983–84.

A study of nonparametric techniques, especially order statistics, rank order statistics, scores, local optimality properties, and perhaps some asymptotic theory.]

**581 Logic** Spring. Basic topics in mathematical logic, including propositional and predicate calculus; formal number theory and recursive functions; completeness and incompleteness theorems.

**611–612 Seminar in Analysis** 611 may not be offered 1983–84.

**613 Functional Analysis** Fall. Topological vector spaces. Banach and Hilbert spaces, Banach algebras. Additional topics to be selected by instructor.

**[615 Fourier Analysis** Not offered 1983–84]

**[622 Riemann Surfaces** Not offered 1983–84]

**[623 Several Complex Variables** Not offered 1983–84.]

**627 Seminar in Partial Differential Equations** Fall.

**631–632 Seminar in Algebra** Fall.

**635 Topics in Algebra I** Fall. Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.

**[637 Algebraic Number Theory** Not offered 1983–84.]

**[639 Topics in Algebra II** Not offered 1983–84. Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.]

**640 Homological Algebra** Fall.

**651–652 Seminar in Topology**

**653–654 Algebraic Topology** Fall. Duality theory in manifolds, applications, cohomology operations, spectral sequences, homotopy theory, general cohomology theories, categories and functors.

**657–658 Advanced Topology** Selection of advanced topics from modern algebraic, differential, and geometric topology. Course content varies.

**661–662 Seminar in Geometry** May not be offered 1983–84.

**[667 Algebraic Geometry** Not offered 1983–84]

**[670 Topics in Statistics** Not offered 1983–84. 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.]

**671–672 Seminar in Probability and Statistics**

**[674 Multivariate Analysis** Not offered 1983–84]

**675–676 Statistical Decision Theory**

**677–[678] Stochastic Processes** 677, fall; [678 not offered 1983–84.]

**681–682 Seminar in Logic**

**683 Model Theory**

**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.

**[685 Metamathematics** Not offered 1983–84. Topics in metamathematics. Course content varies.]

**687 Set Theory** Spring. Models of set theory. Theorems of Gödel and Cohen, recent independence results.

**688 Automatic Theorem Proving** Fall. Prerequisites: Math 581. Some feeling for what is computationally feasible, using existing and near-term technologies, would be helpful. Automatic theorem proving is that area of formal logic concerned with proof-theoretic computational efficiency. This course will survey the following areas: (1) machine-oriented predicate calculus systems (resolution and natural deduction styles); (2) the computational complexity of the decidable fragments of predicate calculus and other frequently occurring decidable theories (e.g. Presburger arithmetic); (3) rewrite rule systems, which simplify expressions in algebraic theories to normal forms and the basic theorems in universal algebra that guarantee that such normal forms exist; (4) languages for knowledge representation, which facilitate the accessing according to content of possibly useful prior results; (5) heuristic systems, which discover proofs through educated guesses (e.g., which variable one should induct on to prove the associativity of addition); (6) artificial intelligence systems, which aim to simulate the evolution of mathematics by automatically generating new concepts, generalizations, conjectures from existing theorems.

**690 Supervised Reading and Research**

## Modern Languages and Linguistics

J. Jasanoff, chairman (Department of Modern Languages and Linguistics); J. Noblitt, associate chairman (314 Morrill Hall); J. Gair, director of undergraduate studies (407 Morrill Hall); L. Babby, J. Bowers, W. Browne, N. Clements, J. Grimes, W. Harbert, F. Huffman, J. Jasanoff, R. Jones, E. Jorden, G. Kelley, H. Kufner, R. Leed, S. McConnell-Ginet, J. McCoy, G. Messing, J. Noblitt, C. Piera, C. Rosen, D. Solá, M. Suñer, F. van Coetsem, L. Waugh, J. Wolff, A. Zaenen

The Department of Modern Languages and Linguistics offers courses in linguistics (the study of the structure of language) and elementary, intermediate, and advanced courses in the minor as well as the major languages of Europe and south, southeast, and east Asia. Students take these courses because they are interested in the area in which the language is spoken.

See Modern Languages, Literatures, and Linguistics, below.

## Modern Languages, Literatures, and Linguistics

Courses in modern languages, literatures, and linguistics are offered by various departments of the college. Most courses in modern languages and linguistics are offered by the Department of Modern Languages and Linguistics (see Linguistics, pp. 161–163). Literature courses, and certain language courses as well, are taught by the following departments:

Africana Studies and Research Center: Swahili  
 Asian Studies: Chinese, Japanese  
 Classics: Greek, Latin  
 German Literature: German  
 Near Eastern Studies: Akkadian, Arabic, Aramaic,  
 Hebrew  
 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.

## Burmese

**101-102 Elementary Course** 101, fall; 102, spring. 6 credits each term. Prerequisite for Burmese 102: Burmese 101 or equivalent.

Hours to be arranged. R. B. Jones.  
 A semi-intensive course for beginners or for those who have been placed in the course by examination. The purpose of the course is to give a thorough grounding in all the language skills: listening, speaking, reading, and writing.

**201-202 Burmese Reading** 201, fall; 202, spring. 3 credits each term. Prerequisites: for Burmese 201, qualification in Burmese; for Burmese 202, Burmese 201.

Hours to be arranged. R. B. Jones.

**203-204 Composition and Conversation** 203, fall; 204 spring. 3 credits each term. Prerequisites: for Burmese 203, qualification in Burmese; for Burmese 204, Burmese 203.

Hours to be arranged. R. B. Jones.

**301-302 Advanced Burmese Reading** 301, fall; 302, spring. 4 credits each term. Prerequisites: for Burmese 301, Burmese 202 or permission of instructor.

Hours to be arranged. R. B. Jones.  
 Selected Burmese readings in various fields.

## Cambodian (Khmer)

**101-102 Elementary Course** 101 fall; 102, spring. 6 credits each term. Prerequisite for Cambodian 102: Cambodian 101 or equivalent.  
 Sec, M-F 8; lec to be arranged. F. E. Huffman.

**201-202 Cambodian Reading** 201, fall; 202, spring. 3 credits each term. Prerequisites: for Cambodian 201, qualification in Cambodian; for Cambodian 202, Cambodian 201.

Hours to be arranged. F. E. Huffman.

**203-204 Composition and Conversation** 203, fall; 204, spring. 3 credits each term. Prerequisites: for Cambodian 203, qualification in Cambodian; for Cambodian 204, Cambodian 203.

Hours to be arranged. F. E. Huffman.

**301-302 Advanced Cambodian** 301, fall; 302, spring. 4 credits each term. Prerequisites: for Cambodian 301, Cambodian 201-202 or the equivalent; for Cambodian 302, Cambodian 301.

Hours to be arranged. F. E. Huffman.

**401-402 Directed Individual Study** 401, fall; 402, spring. For advanced students. 4 credits each term. Prerequisite: permission of instructor.

Hours to be arranged. F. E. Huffman.

**404 Structure of Cambodian** Spring. 4 credits. Prerequisite: Linguistics 101-102 or equivalent.

Hours to be arranged. F. E. Huffman.

## Cebuano (Bisayan)

**[101-102 Basic Course** 101, fall; 102, spring. Offered according to demand. 6 credits each term. Prerequisite for Cebuano 102: Cebuano 101 or equivalent. Not offered 1983-84.

Hours to be arranged. J. U. Wolff.  
 A semi-intensive course for beginners.]

## Chinese

### Language and Linguistics

**101-102 Elementary Course** 101, fall; 102, spring. 6 credits each term. Prerequisite for Chinese 102: Chinese 101 or equivalent.

Lecs, M W F 9:05; drill, M-F 8 or 2:30. J. McCoy, P. Wang, and staff.

A semi-intensive course for beginners or for those who have been placed in the course by examination. The course gives a thorough grounding in all the language skills: listening, speaking, reading, and writing.

**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.

Lec, T 11:15; drills M W F 10:10. S. Fessler, J. McCoy.

Conversation in standard Cantonese as spoken in Hong Kong and Canton.

**113-114 Cantonese Elementary Readings** 113, fall; 114, spring. 3 credits each term. Prerequisite: permission of instructor. Both Chinese 112 and 114 or equivalents are necessary to fulfill any language requirements.

Lec, R 11:15; drills, T R 10:10. S. Fessler, J. McCoy. Readings in modern expository prose with Cantonese pronunciation.

**201-202 Intermediate Chinese I** 201, fall; 202, spring. 4 credits each term. Prerequisite: qualification in Chinese.

M-F 9:05 or 11:15. P. Wang and staff.

**211-212 Intermediate Cantonese I** 211, fall; 212, spring. 4 credits each term. Prerequisite: Cantonese 112 or permission of instructor.

Hours to be arranged. S. Fessler.

**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.

213: M W 11:15, plus 1 hour to be arranged. 214: hours to be arranged. Staff.

**301-302 Intermediate Chinese II** 301, fall; 302, spring. 4 credits each term. Prerequisites: for Chinese 301, Chinese 202 or equivalent; for Chinese 302, Chinese 301.

M W F 11:15. P. Ni.  
 Readings and drill in modern expository Chinese.

**303-304 Chinese Conversation-Intermediate** 303, fall; 304, spring. 1 credit each term. May be repeated for credit. Prerequisite: Chinese 201-202. S-U grades only.

T R 1:25. Staff.  
 Guided conversation and oral composition and translation. Corrective pronunciation drill.

**311-312 Intermediate Cantonese II** 311, fall; 312, spring. 4 credits each term. Prerequisite: Cantonese 212 or permission of instructor.

Hours to be arranged. S. Fessler.

**315-316 Chinese Composition** 315, fall; 316, spring. 4 credits each term. Prerequisite: Chinese 202 or 212.

M W F 10:00. P. Ni.  
 Special emphasis on developing the style and vocabulary of modern written Chinese through practice and example.

**[401 History of the Chinese Language** Fall or spring, according to demand. 4 credits. Prerequisite: permission of instructor. Not offered 1983-84.

Hours to be arranged. J. McCoy.  
 Survey of phonological and syntactic developments in Chinese.]

**403 Linguistic Structure of Chinese: Phonology and Morphology** Fall or spring, according to demand. 4 credits. Prerequisite: permission of instructor. Offered alternate years.

Hours to be arranged. J. McCoy.  
 Introductory course in the phonology of modern Mandarin Chinese.

**404 Linguistic Structure of Chinese: Syntax** Fall or spring, according to demand. 4 credits. Prerequisite: permission of instructor. Offered alternate years.

J. McCoy.  
 Syntax of modern Mandarin Chinese.

**[405 Chinese Dialects** Fall or spring, according to student demand. 4 credits. Prerequisite: permission of instructor. Not offered 1983-84.

Hours to be arranged. J. McCoy.  
 Introductory survey of modern dialects and their distinguishing characteristics.]

**411-412 Readings in Modern Chinese Literature** 411, fall; 412, spring. 4 credits each term. Prerequisite: Chinese 302.

M W F 1:25. P. Ni.

**413-414 Chinese Reading Tutorials** 413, fall; 414, spring. 2 credits each term. May be repeated for credit. Prerequisite: Chinese 302 or equivalent and permission of instructor. S-U grades only.

Hours to be arranged. Staff.  
 Individual or small-group guidance in advanced Chinese texts, designed primarily for Asian studies majors taking other courses with reading assignments in Chinese.

**607 Chinese Dialect Seminar** Fall or spring, on student demand. 4 credits. Prerequisite: Chinese 405 and permission of instructor.

Hours to be arranged. J. McCoy.  
 Analysis and field techniques in a selected dialect area.

## FALCON

**161-162 Intensive Mandarin Course** 161, fall; (parallels first 16 credits of instruction in regular program); 162, spring (parallels second 16 credits of instruction in regular program). Prerequisite: permission of instructor.

J. McCoy and staff.  
 Foreign Language Requirement: Proficiency is attained by passing 161.

## Literature

**313 Chinese Philosophical Texts** Fall or spring, on demand. 4 credits. Prerequisite: Chinese 214.

T. L. Mei.

**314 Classical Narrative Texts** Spring. 4 credits. Prerequisite: Chinese 214.

E. M. Gunn.

**420 T'ang and Sung Poetry** Fall or spring on demand. 4 credits. Prerequisite: permission of instructor.

T. L. Mei.

**421–422 Directed Study** Fall or spring or both 2–4 credits each term. Prerequisite: permission of instructor.  
Staff.

**424 Readings in Literary Criticism** Fall or spring, on demand. 4 credits. Prerequisite: permission of instructor.  
T. L. Mei.

**430 Readings in Folk Literature** Fall or spring, on demand. 4 credits. Prerequisite: permission of instructor.  
J. McCoy.

*Note:* For complete descriptions of courses numbered 600 or above, consult the appropriate instructor.

**603 Seminar in Chinese Poetry and Poetics** Fall or spring, on demand. 4 credits. Prerequisite: permission of instructor.

**605 Seminar in Chinese Fiction** Fall or spring, on demand. 4 credits. Prerequisite: permission of instructor.  
E. M. Gunn.

**609 Seminar in Chinese Folk Literature** Fall or spring, according to demand. 4 credits. Prerequisite: permission of instructor.  
J. McCoy.

**621–622 Advanced Directed Reading** 621, fall; 622, spring. Credit to be arranged. Prerequisite: permission of instructor.  
E. J. Gunn, J. McCoy, T. L. Mei.

## Dutch

**131–132 Reading Course** 131, fall; 132, spring. 3 credits each term. Prerequisite: permission of instructor.  
Hours to be arranged. F. van Coetsem.

**[Seminar in Dutch Linguistics (German 740)** Not offered 1983–84.]

## English

**Intensive English Program**, see p. 204.

**102 English as a Second Language** Fall. 6 credits. Prerequisite: placement by the instructor.  
M–F 9:05. M. Martin.  
Intermediate spoken and written English, with emphasis on speaking, understanding, and reading.

**103 English as a Second Language** Spring. 3 credits. Prerequisite: English 102 or placement by the instructor.  
M W F 2:30. M. Martin.  
Designed for those who have completed English 102 and who require or desire further practice. Emphasis is on developing control of written as well as spoken language.

**211–212 English as a Second Language** 211, fall; 212, spring. 3 credits each term. Prerequisite: placement by the instructor.  
M W F 10:10, 11:15, 2:30; T R 2:30–4. M. Martin.  
Advanced reading and writing, with emphasis on improving vocabulary and control of college-level written English.

**213 Written English for Nonnative Speakers** Spring. 3 credits. Prerequisite: placement by the instructor.  
T R 10:10, plus a weekly interview. 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 Seminar

**215–216 English for Later Bilinguals** 215, fall; 216, spring. 3 credits each term. Not designed for students whose schooling has been entirely in English. Prerequisite for English 216, English 215.  
M W F 2:30. M. Martin.

A course designed to strengthen the English-language skills of students who have studied for one to five years in American high schools and whose language in the home is not English. Intensive work in written English is offered, with emphasis on sentence structure, cohesion, vocabulary expansion, grammatical structure, and maturity of style.

## French

J. Béreaud, chairman; D. Brewer, A. M. Colby-Hall, I. Daly, N. Furman (director of undergraduate studies, 262 Goldwin Smith Hall, 256-8222), D. I. Grossvogel, R. Klein, P. Lewis, S. A. Littauer, E. P. Morris, J. S. Noblitt, A. Seznec, L. R. Waugh, A. Zaehnen

## The Major

The major in French 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 and linguistic analysis.

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 at Cornell and become a major. Students wishing to major in French should consult the director of undergraduate studies, Professor Furman, of the Department of Romance Studies, who will admit them to the major. After their admission students will choose an adviser from among the French faculty. Students interested in the linguistics option should consult Professor Waugh, Department of Modern Languages and Linguistics.

The major has a core, required of all majors, and two options that attempt to reflect the variety of student interests, yet maintain the focus for a coherent and substantial program of studies.

## The Core

- 1) All majors are expected to acquire a sound degree of competence in language. This competence is demonstrated by the successful completion of French 312 or by the passing of a special examination to be taken no later than the end of the junior year. A typical program will involve two semesters of language at the 200 level (to be taken no later than the end of the sophomore year) and two semesters of language at the 300 level (French 311–312). Students may bypass any part of the sequence through placement examinations.
- 2) In addition, all majors are expected to take French 201 and 202. At least one of these should be completed successfully no later than the end of the sophomore year.

## The Options

The following groups intentionally overlap in part, yet each is intended to emphasize different aspects of French culture.

### *The literature option*

- 1) The successful completion of six additional courses in French literature or civilization at the 300 level or above. These courses will be selected in consultation with the student's major adviser and 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).

- 2) The successful completion of two related courses in one of the following: (a) French literature; (b) French linguistics; (c) French history, culture, music, or history of art or architecture; (d) courses in linguistic theory, history of language, psycholinguistics, or philosophy of language.

### *The linguistic option*

- 1) The successful completion of six courses in French and general linguistics (in addition to Linguistics 101–102). These courses will include at least one course in the history of French and one course in the structure of French.
- 2) The successful completion of two courses (preferably a sequence) in one of the following: (a) French literature and civilization, (b) psycholinguistics, (c) philosophy of language, (d) anthropological linguistics.

Whatever option a student chooses, he or she is urged to take advantage of the ample flexibility offered by the French major. Students who wish to pursue careers in business, law, medicine, or teaching may coordinate their work with preprofessional programs. Similarly, interdisciplinary work is strongly encouraged; students may elect to enrich their major with related courses in history, archaeology, Classics, comparative literature, English and American literature, anthropology, music, history of art, philosophy, government, linguistics, and other literatures and languages.

French majors may study in France for a semester or a year during their junior year under any of the several study-abroad plans that are recognized by the Department of Romance Studies and the Department of Modern Languages and Linguistics and allow for the transfer of credit. The director of undergraduate studies has information about such plans.

**Honors.** The honors program encourages well-qualified students to do independent work in French, outside the structure of courses. The preparation of the senior honors essay, generally involving three terms, provides a unique learning opportunity, since it allows for wide reading, careful outlining, and extensive rewriting to a degree not practically possible in the case of course papers. At each stage of their work, the students will have regular weekly meetings with faculty tutors.

No special seminars or courses are required of honors students. The junior tutorial (ordinarily two terms) will be devoted to intensive study of selected problems or authors and to the choice of a topic for the honors essay; the senior tutorial is devoted to the writing of that essay. Honors students may be released from one or two courses in either the junior or senior year to have adequate time for honors work. (Credit is obtained by enrolling in French 419–420.) Students will take an informal oral examination at the end of the senior year. Honors students are selected on the basis of their work in French language and literature courses in the freshman and sophomore years. Students interested should consult Professor Morris for details no later than the spring term of the sophomore year, and earlier if possible. Honors work in French linguistics will be supervised by Professor Waugh.

**Fees.** Depending on the course, a small fee may be charged for copies of texts for course work.

## Language and Linguistics

**121–122 Elementary Course** 121, fall; 122, spring. 4 credits each term. Intended for beginners or students placed by examination. Prerequisite for French 122; French 121 or equivalent. Students who obtain a CPT score of 560 after French 121–122 attain qualification and may enter the 200-level sequence; otherwise French 123 is required for qualification.

Lec, R 9:05, 10:10, 11:15, or 1:25; drills, M T W F 8, 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30.  
N. Gaenslen.

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.

**123 Continuing French** Fall or spring. 4 credits. Limited to students who have previously studied French and have a CPT achievement score between 450 and 559. Satisfactory completion of French 123 fulfills the qualification portion of the language requirement.

Lec. T 10:10 or 12:20; drills, M W F 8, 9:05, 10:10, 11:15, 12:20, 1:25, 2:30, or 3:35.  
S. A. Littauer.

An all-skills course designed as the final course in the sequence. A review of grammar is included in addition to reading, writing, and conversation.

**200 Intermediate Course: Language and Literature** Fall or spring. 3 credits. Prerequisite: qualification in French with a CPT score no higher than 629. Offered by the Department of Romance Studies.

Fall: M W F 9:05 or 12:20, or T R 8:40–9:55 or 10:10–11:25. Spring: M W F 9:05 or 12:20, or T R 10:10–11:25. S. Tarrow and staff.

Designed to provide an introduction to contemporary French culture and literature. Texts read and discussed are selected for their cultural and humanistic value. One-third of class time is devoted to grammar review, with emphasis on oral participation as well as improvement of language skills.

**203 Intermediate Composition and Conversation** Fall or spring. 3 credits. Prerequisite: qualification in French.

Lec. T 11:15 or 1:25, W 2:30, or R 11:15; drills, M W F 8, 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. I. Daly. Emphasis on conversation. Weekly grammar review in addition to composition.

**204 Intermediate Composition and Conversation** Fall or spring. 3 credits. Enrollment limited. Prerequisite: French 203 or 211 with a grade of C– or better or consent of instructor, or placement by Advanced Standing Examination offered by the Department of Modern Languages and Linguistics or the Department of Romance Studies.

Fall: lec. T 2:30 or W 1:25; drills, M W F 10:10, 2:30, or 3:35. Spring: lec. T 10:10 or W 1:25; drills, M W F 9:05, 10:10, 11:15, 12:20, or 1:25. A. Zaehnen. Emphasis on conversation with some grammar review and compositions, all based on contemporary texts. Taught in French.

**211 Intermediate French** Fall. 3 credits. Prerequisite: qualification. Offered by the Department of Romance Studies. Taught in French.

M W F 1:25 or T R 12:20–1:35. D. Brewer and staff. Provides a systematic grammar review with emphasis on written exercises; reading competence is acquired through the discussion of short stories.

**212 Intermediate French** Spring. 3 credits. Prerequisite: French 211 or 203, or placement by Advanced Standing Examinations administered by either the Department of Modern Languages and Linguistics or the Department of Romance Studies. Offered by the Department of Romance Studies. Taught in French.

M W F 10:10 or 1:25. D. Brewer and staff. Concerned with vocabulary expansion and the development of analytical reading ability.

**310 Advanced Conversation** Fall or spring. 2 credits. Limited to 15 students. Prerequisite: French 203 or 211 (or equivalence on the Cornell CASE placement examination).

Fall: T R 8:40–9:55 or 2:30–3:45. Spring: T R 8:40–9:55, 10:10–11:25, or 12:20–1:35.  
J. Béreaud and staff.

This course is based on audio-visual materials used in class; slides and recordings will accompany

extensive discussions. A modest amount of reading each week will aim at increasing students' vocabulary.

**311 Advanced Composition and Conversation** Fall. 4 credits. Prerequisite: French 204 or 212 or placement by the CASE test. Offered by the Department of Romance Studies.

M W F 9:05, 12:20, or 1:25. J. Béreaud and staff. All-skills course. Detailed study of present-day syntax. Reading and discussion of texts of cultural relevance.

**312 Advanced Composition and Conversation** Spring. 4 credits. Prerequisite: French 311 or placement by CASE test.

M W F 10:10 or 1:25. E. Morris and staff. Continuation of work done in French 311. Less emphasis will be placed on study of grammar, more on the examination of texts and on questions of style.

**401 History of the French Language** Fall. 4 credits. Prerequisites: qualification in French and Linguistics 101, or permission of instructor. Offered alternate years.

M W F 2:30. J. S. Noblitt. 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.

**407 Applied Linguistics: French** Fall. 4 credits. Prerequisite: qualification in French.

M W F 10:10. J. S. Noblitt. Designed to equip the student with the ability to apply linguistic descriptions in teaching French, with special emphasis on phonetics and morphology.

**408 Linguistic Structure of French** Spring. 4 credits. Prerequisite: qualification in French and Linguistics 101, or permission of instructor. Offered alternate years.

M W F 2:30. Staff. A descriptive analysis of modern French, with emphasis on its phonology, morphology, syntax, and semantics.

**[410 Semantic Structure of French]** Fall or spring. 4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1983–84; next offered 1984–85.

Hours to be arranged. L. R. Waugh. Introduction to French semantic elements—morphological, lexical and syntactic—from a Jakobsonian and functional perspective.]

**[424 Composition and Style]** Spring. Not offered 1983–84.]

**602 Linguistic Structure of Old and Middle French** Spring. 4 credits. Prerequisite: French 408 or permission of instructor. Offered alternate years.

Hours to be arranged. J. S. Noblitt. Through the study of Old and Middle French texts, students analyze synchronically aspects of the grammar of the language at different periods.

**[604 Contemporary Theories of French Grammar]** Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1983–84.

Hours to be arranged. Staff. Selected readings of twentieth-century French linguistics.]

**700 Seminar in French Linguistics** Fall or spring, according to demand. 4 credits.

Hours 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; semantics of French.

## Literature

**[107 Freshman Seminar: Readings in Modern Literature]** Not offered 1983–84.]

**109 Freshman Seminar: Techniques of Interpretation: An Introduction to Semiotics (also Romance Studies 109)** Fall and spring. 3 credits.

T R 8:40–9:55. K. Lockhart. In its broadest meaning semiotics is the study of signs that carry information: roadside signs, fashions, advertisements, publicity posters, literary modes. This course, which does not presuppose prior technical knowledge, will introduce the students to a critical reading of signs: the signifier (the concrete expression of the sign) and the signified (the message) and their various interactions. Readings will include such books as R. Barthes, *Mythologies*, or T. Hawkes, *Structuralism and Semiotics*. Exercises will be essays on how to analyze various signs taken from practical experience, such as advertisements from magazines or T.V. or from cultural phenomena (fashion codes, artistic modes).

**201 Introduction to French Literature** Fall or spring. 3 credits. Prerequisite: qualification. French 201 serves as a prerequisite for all 300-level courses in French literature and is required of all majors. The course is divided into small sections. Three sections are taught entirely in French (M W F 9:05, 10:10, or T R 10:10); the others will use English and as much French will be used as the language proficiency of the students may allow. Readings for all sections are the same, and all in French. Papers may be written in French or in English.

Fall: M W F 9:05, 10:10, 11:15, or 12:20, or T R 8:40–9:55, 10:10–11:25, or 12:20–1:35. Spring: M W F 9:05, 11:15, or 1:25, or T R 8:40–9:55.  
E. Morris and staff. The work of five or six major French authors from the nineteenth and twentieth centuries is introduced (novels, plays, poems). Stress is on the development of reading skills and, more generally, on cultural, sociological, and aesthetic implications of the texts. Reading will include works of such authors as Baudelaire, Mallarmé, Flaubert, Sartre, Camus; and Beckett.

**202 Studies in French Literature** Fall or spring. 3 credits. Prerequisite: French 201 or a CPT achievement score of 650 or more (students who have not taken French 201 should obtain consent of instructor; those with scores in the 560–649 range should see the description of French 200 and 201). Required of all majors, but not limited to them. A fee is charged for a number of short texts distributed by the instructor.

Fall: M W F 12:20. Staff. Spring: M W F 12:20 or T R 10:10–11:25. R. Klein 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).

**[320 French Civilization]** Not offered 1983–84. Next offered 1984–85.]

**330 French Philosophical Readings of Jean Genet (also French 530)** Fall. 4 credits.

W 2:30–4:25. R. Klein. Two of the leading postwar French philosophers, Jean-Paul Sartre and Jacques Derrida, have devoted an important part of their work to the study of an author whose plays, autobiographical fictions, and critical essays seem very removed from abstract, theoretical concerns. This course will focus primarily on reading closely the works of Genet but will include regular discussions of extracts from Sartre's *Saint Genet* and Derrida's *Glas*.

**[331 Masterpieces of French Drama I: The Classical Era]** Fall. Not offered 1983–84.

P. Lewis.]



**[332 Masterpieces of French Drama II: The Modern Era]** Not offered 1983–84.]

**334 The Novel as Masterwork** Spring. 4 credits. Prerequisite: French 201 or permission of instructor. Taught in French.

M W F 12:20. N. Furman.

In addition to 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.

**335 Romance to Revolution: The French Novel before 1789** Fall. 4 credits. Taught in French.

M W F 10:10. D. Brewer.

In addition to considering formal questions relating to the development of the novel in France, this course will examine problems such as the appearance of narrative and historical consciousness, the representation of woman, and the relation between literature and society. Texts read will include those of such major writers as Rabelais, Montaigne, Mme de LaFayette, Prevost, Rousseau, Diderot, and Sade.

**[337 French Poetry from Its Origins to the Revolution of 1789]** Not offered 1983–84.]

**[338 French Poetry in the Twentieth Century]** Not offered 1983–84.]

**[347 Masterpieces of Medieval Literature]** Not offered 1983–84.]

**[358 Gustave Flaubert]** Not offered 1983–84. N. Furman.]

**359 French Writings from 1515 to 1562** Fall. 4 credits. Prerequisite: French 202 or permission of instructor. Lectures in French; class discussions in French and English. Papers may be written in French or English.

T R 1–2:15. E. Morris.

An introductory survey. Poems, stories, letters, and tracts by Cl. Marot, Rabelais, Calvin, Francis I (king of France), Marguerite de Navarre (his sister), Louise Labe, J. du Bellay. Topics: the writer's contentious dependency on the powers of church or crown; women writing; printed words; a national idiom; class struggles, warring ideologies and creeds; court manners; learned "humanism"; cultural rivalry with Italy, with ancient Greece and Rome ("Renaissance?"). Foreground: close reading of texts. Background: readings in various historians, side glances at painting and sculpture, audition of a few *chansons*. How does history get written? How do we come by the power of speech? Are the powers of writing like it? Amidst ebullition, does writing have a room of its own?

**[369 Comic Theater in the Seventeenth Century]** Not offered 1983–84.

P. Lewis.]

**[385 Experimental and Contemporary French Novels: Subversion of the Novelistic Genre from Diderot to the Present]** Fall. Not offered 1983–84. D. I. Grossvogel.]

**[387 From Parnassus to Surrealism]** Fall. Not offered 1983–84.]

**388 The French Lyric Romance from Symbolism to Surrealism** Spring. 4 credits. Prerequisite: French 201 or 202.

T R 1–2:15. R. Klein.

This course will trace the development of lyric poetry in France from Hugo and Baudelaire, the heirs of French Romanticism, to the violent disruption of that tradition in Surrealist automatic writing. Particular attention will be paid to the sonnets and love poetry of authors including Rimbaud, Mallarmé, Verlaine, Villon, Valéry, Apollinaire, Breton, and Aime Cesaire.

**[389 French Romanticism]** Not offered 1983–84. N. Furman.]

**[390 Modern French Criticism (also French 690)]** 4 credits. Taught in French. Not offered 1983–84; next offered 1984–85.

P. Lewis.

This course will provide a practical introduction to major currents in contemporary French criticism. While a firm command of the French language is the only indispensable prerequisite, it is assumed that most students will possess the background provided by French 201–202 or equivalent literature courses. Each type of criticism will be considered from three standpoints: (1) the *theories* of literature in which the various approaches are grounded, (2) the methods that they employ, and (3) specific *applications* of those methods in the analysis and interpretation of texts (well-known short works by such authors as Racine, Diderot, Mallarmé, and Sartre). Topics to be discussed will include poetics as a general theory of literature; structuralism and the structural analysis of narrative; the notion of intertextuality and its implications for literary history; deconstruction and the displacement of phenomenological criticism; psychoanalysis and the displacement of thematic criticism; sociocriticism on a "post-Marxist" horizon; and the contribution of pragmatics to recent research on literary language.]

**[395 Camus and His Contemporaries]** Fall. 4 credits. Not offered 1983–84.

S. Tarrow.]

**396 The Contemporary French Novel: 1950 to the Present** Spring. 4 credits.

M W F 11:15. S. Tarrow.

Contrary to predictions, the novel is alive and well in France. The post-Existentialist period has produced a variety of experimental and traditional works, e.g., the *roman noir*, the *nouveau roman*, feminist novels, novels by north African writers. Class discussion will focus on technique and philosophical intention as well as on the relation of the novel to contemporary francophone society. Readings will be selected from such authors as Giono, Vian, Robbe-Grillet, Butor, Sarraute, Duras, Rochefort, Modiano, Leduc, Yacine, Cabanis, Wittig.

**399 French Film and Thought: The Untrammelled Eye (also Comparative Literature 398)** Fall. 4 credits. Prerequisite: for those taking it in French, French 201 or equivalent. Taught in English.

T R 2:30–4:25. D. I. Grossvogel.

The importance of undeflected sight in French thought and motion pictures: the privileging of a childlike eye, the child's world, the awareness of freedom. A phenomenological progression illustrated by such films as *Un chien andalou*, *Zéro de conduite*, *Le Sang d'un poète*, *L'Argent de poche*, etc., and such authors as Breton, Camus, Cocteau, Robbe-Grillet, Sartre, etc.

**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.

**429–430 Honors Work in French** 4 credits each term, with permission of the adviser. Open to juniors and seniors. Consult the director of the honors program, E. Morris.

**447–448 Medieval Literature** 447, fall; 448,

spring. 4 credits each term. Prerequisite: French 201 or permission of instructor. First term not prerequisite to the second.

M W F 9:05. A. Colby-Hall.

French 447 deals with the epic and the theater; 448 with the romance and the lyric. Facility in reading Old French and appreciation of these four major genres are the primary goals of this course.

**[452 Theatre in Sixteenth-Century France]** Spring. Not offered 1983–84.]

**[457 Rabelais]** Not offered 1983–84; next offered 1984–85.]

**[458 Montaigne]** Spring. Not offered 1983–84.]

**[459 Early Sixteenth-Century Poetry: Marot, Sceve, DuBellay]** Not offered 1983–84. R. Klein.]

**[461 The Theater of Molière]** Fall. Not offered 1983–84.]

**[473 Diderot and the Enlightenment]** Fall. Not offered 1983–84.]

**[474 Voltaire: Strategies, Traps, and Play]** Spring. 4 credits. Not offered 1983–84. D. Brewer.]

**[483 Feminism and French Literature (also Women's Studies 483)]** Not offered 1983–84.]

**[485 Reading Workshop: The Short Story]** Not offered 1983–84. N. Furman.]

**493 French Feminisms (also Women's Studies 493)** Spring. 4 credits. Taught in English.

M W F 10:10. N. Furman.

This course will examine the political, theoretical, and literary concerns of contemporary French feminist writers. Reading will include representative texts by Simone de Beauvoir, Marguerite Duras, Luce Irigaray, Monique Wittig, and Hélène Cixous.

**[496 The Aesthetics of Coincidence (also Comparative Literature 496)]** Not offered 1983–84.]

**530 French Philosophical Readings of Jean Genet** Fall.

W 2:30–4:25. R. Klein.

For description see French 330.

**561 A Dozen Molière Plays and Some Lingering Dramatic Problems (also Comparative Literature 561)** Fall. 4 credits. Prerequisite: If counted as French (readings in French), at least one French course at 300 level. Taught in English.

M 2:30–4:25. D. I. Grossvogel.

The course will examine such questions as the importance of the farce in the evolution of theater; the Italian influence in France; closed space, patronage and the comedy of manners; "plaire" and the hybrid genres; poetics on stage; limits of comedy; etc.

**[637 Old French Dialectology]** Fall. Not offered 1983–84.

A. Colby-Hall.]

**639–640 Special Topics in French Literature** 639, fall; 640, spring. 4 credits each term.

Staff.

Guided independent study for graduate students.

**[644 Medieval Seminar: The Old French Epic]** Not offered 1983–84.]

**[646 Medieval Seminar: Villon]** Spring. Not offered 1983–84. A. Colby-Hall.]

**648 Medieval Seminar: La Roman de la Rose** Spring. 4 credits. M 2:30–4:25. A. Colby-Hall.

**[660 The Moral Tradition]** Fall. 4 credits. Not offered 1983–84.]

**[661 Racine and His Critics]** Not offered 1983–84.]

**[666 Seventeenth-Century Seminar: Moralities in Fiction: The Classical Moment (also Comparative Literature 666)]** Not offered 1983–84.]

**[669 Seventeenth-Century Seminar: Illusion and Representation]** Not offered 1983–84.  
P. Lewis.]

**[683 Lacan (also Comparative Literature 607)]** Not offered 1983–84.]

**688 Gerard de Nerval** Spring. 4 credits.  
W 2:30–4:25. E. Morris.

Admired by contemporaries like Gautier and Baudelaire, the works of Nerval dropped into general oblivion after the writer's death in 1855, only to reappear, canonized (indeed Larousse), after the Second World War. The course will attempt to account for those happenings and to reread Nerval's writings in the light of recent reinterpretations of romanticism (Beguín, De Man), madness (Foucault), the autobiographical project (Lejeune, Beaujour, E. Burt), and the work of Freud (Schur, Derrida).

**[689 Bohemians and Dandies]** Not offered 1983–84.]

**[694 Six Critics In Search of an Author: Sartre, Criticism, Critics (also Comparative Literature 604)]** Not offered 1983–84.]

**[696 Proust and Mystery (also Comparative Literature 696)]** Spring. 4 credits. Not offered 1983–84.  
D. I. Grossvogel.]

## Related Courses in Other Departments

**The European Novel (Comparative Literature 363–364)**

**Grammar in the Middle Ages (Society for the Humanities 420)**

**The Rhetoric of Renaissance Humanism (Society for the Humanities 421–422)**

**Feminist Theory: Franco-American Currents (Society for the Humanities 419)**

**Petrarch, Ronsard, and Donne (Comparative Literature 658)**

**Baudelaire and Hugo (Comparative Literature 671)**

**The Language(s) of Politics in the Renaissance (Society for the Humanities 425–426)**

## Germanic Studies

E. Augsburg, V. T. Bjarnar, E. A. Blackall, H. Deinert (director of undergraduate studies [literature], 188 Goldwin Smith Hall, 256-5265), I. Ezergailis, S. L. Gilman, A. Groos, W. Harbert, J. C. Harris, P. U. Hohendahl, J. H. Jasanoff, I. Kovary, H. L. Kufner (director of undergraduate studies [language], 211 Morrill Hall, 256-4230), C. A. Martin, P. W. Nutting, G. Valk, F. C. van Coetsem

## The German 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 major advisers, H. Deinert, in the Department of German Literature, or H. L. Kufner, 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. 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 Comparative Literature, History, History of Art, Government, Music, 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 major advisers, H. Deinert or H. L. Kufner. All German majors, particularly those who have had no German prior to coming to Cornell, are encouraged to spend at least part of their junior year abroad.

## 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, theatre arts, or other suitable subjects. 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 Literature. 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.

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 and German, psychology and German, chemistry and German, and biology and German.

**Honors.** The honors program in German is open to superior students who wish 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 Seminar Requirement

The following courses will satisfy the Freshman Seminar requirement: German 109, 151, 211, and 312. For details students should consult the instructors.

**Fees.** Depending on the course, a small fee may be charged for photocopied texts for course work.

## Languages and Linguistics

**121–122 Elementary Course** 121, fall; 122, spring. 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.

Lec, T 9:05, 11:15, or 1:25; drills, M W R F 8, 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. H. L. Kufner. 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.

**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.

Fall: lec, M 2:30; drills, T–F 9:05, 10:10, 11:15, or 12:20. Spring: lec, M 2:30; drill, T–F 10:10 or 12:20. W. E. Harbert.

An all-skills course designed to prepare students for study at the 200 level.

**203 Intermediate Composition and Conversation** Fall or spring. 3 credits. Prerequisite: qualification in German.

Fall: M W F 9:05, 10:10, 11:15, or 1:25. Spring: M W F 9:05, or 1:25. Staff.

**204 Intermediate Composition and Conversation** Fall or spring. 3 credits. Prerequisite: German 203 or permission of instructor.

Fall: M W F 11:15. Spring: M W F 10:10 or 11:15. Staff.

**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.

M W F 11:15 or 1:25. Staff.

Emphasis is on increasing the student's oral and written command of German. Detailed study of present-day syntax and different levels of style.

**306 Zeitungsdeutsch** Spring. 4 credits. Prerequisite: German 304 or equivalent.  
M W F 11:15. E. Augsburg.

**[401 Introduction to Germanic Linguistics]** Fall. 4 credits. Prerequisite: Linguistics 101 or permission of instructor. Not offered 1983–84.

Hours to be arranged. W. E. Harbert. Survey of major issues in Germanic linguistics, with emphasis on historical and dialectal problems.]

**[402 History of the German Language]** Spring. 4 credits. Prerequisite: German 204 and Linguistics 101 or permission of instructor. Offered alternate years. Not offered 1983–84.

Hours to be arranged. F. van Coetsem. Phonological, syntactic, and semantic developments from pre-Old High German times to the present.]

**[403 Modern German Phonology]** Fall. 4 credits. Prerequisites: German 304 or equivalent, and Linguistics 101, 111, or 301. Not offered 1983–84.

Hours to be arranged. F. van Coetsem. The phonological system of German is viewed from various theoretical approaches.]

**404 Modern German Syntax** Spring. 4 credits. Prerequisites: German 304 or equivalent, and Linguistics 101 or 303.

Hours to be arranged. W. E. Harbert. An application of selected theoretical syntactic models to problems in the syntax of modern German.

**[405 German Dialectology]** Fall. 4 credits. Prerequisite: German 304 or equivalent, and Linguistics 101 or equivalent. Not offered 1983–84.

H. L. Kufner. Survey of German dialects, the work done at the *Sprachatl*, and a discussion of modern approaches to dialectology.]

**[406 Runology]** Fall. 4 credits. Prerequisite: German 401. Not offered 1983–84.

Hours to be arranged. F. van Coetsem.  
A study of the inscriptions in the older *futhark* and their relevance to historical Germanic linguistics.]

**[407 Applied Linguistics: German]** Fall. 4 credits. M W F 9:05. H. L. Kufner.

Designed to equip the teacher of German with the ability to apply current linguistic theory to the second-language learning situation.

**[408 Linguistic Structure of German]** Spring. 4 credits. Prerequisites: German 204 and Linguistics 101–102, or permission of instructor. Not offered 1983–84.

Hours to be arranged. H. L. Kufner.  
A descriptive analysis of present-day German, with emphasis on phonology and syntax.]

**[602 Gothic]** Spring. 4 credits. Prerequisite: Linguistics 101. Not offered 1983–84.

Hours to be arranged. F. van Coetsem.  
Linguistic structure of Gothic, with extensive readings of Gothic texts.]

**[604 Old Low Franconian, Old Frisian]** Fall. 4 credits. Prerequisite: Linguistics 102. Offered in alternate years. Not offered 1983–84.

Hours to be arranged. F. van Coetsem.]

**[605 Structure of Old English]** Fall. 4 credits. Prerequisite: German 401. Not offered 1983–84.

Hours to be arranged. W. E. Harbert.  
Linguistic overview of Old English, with emphasis on phonology and syntax.]

**[606 Topics in Historical Germanic Phonology]** Fall. 4 credits. Prerequisite: German 401.

Hours to be arranged. F. van Coetsem.  
The development of the sound system from Proto-Germanic to its daughter languages.

**[607 Topics in Historical Germanic Morphology]** Spring. 4 credits. Prerequisite: German 401. Not offered 1983–84.

Hours to be arranged. J. Jasanoff.  
The Germanic verbal system and its Indo-European origins.]

**[608 Topics in Historical Germanic Syntax]** Fall. 4 credits. Prerequisite: German 401. Not offered 1983–84.

Hours to be arranged. W. E. Harbert.  
A diachronic and comparative investigation of syntactic processes in the older Germanic languages.]

**609–610 Old Norse** 609, fall; 610, spring. 4 credits each term.

Hours to be arranged. V. Bjarnar.  
Study of the linguistic structure of Old Norse, with extensive reading of Old Norse texts.

**[611 Readings in Old High German and Old Saxon]** Spring. 4 credits. Not offered 1983–84.

Hours to be arranged. 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*.]

**[612 Germanic Tribal History]** Spring. 4 credits. Prerequisite: German 401. Not offered 1983–84.

Hours to be arranged. F. van Coetsem.  
The history of the Germanic tribes from about 500 B.C. to A.D. 500; introduces the study of Proto-Germanic and the separation of the Germanic languages.]

**631–632 Elementary Reading I** 631, fall; 632, spring. 3 credits each term. Limited to graduate students. Prerequisite for German 632: German 631 or equivalent.

M W F 4:30 or T R 1:25–2:40. I. Kovary.  
Emphasis is on developing skill in reading, although some attention will be devoted to the spoken language, especially to listening comprehension.

**[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 1983–84.

Hours to be arranged. W. E. Harbert.]

**[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 1983–84.

Hours to be arranged. Staff.  
Topics include phonology, morphology, syntax, and dialectology of the older Germanic languages.]

**[730 Seminar in German Linguistics]** Fall or spring, subject to the needs of students and to the limitations of staff time. 4 credits. Not offered 1983–84.

Hours to be arranged. Staff.  
Selected topics including the history, structure, and dialects of German.]

**[740 Seminar in Dutch Linguistics]** Spring, subject to the needs of students and to the limitations of staff time. 4 credits. Not offered 1983–84.

Hours to be arranged. F. van Coetsem.  
Selected topics including the history, structure, and dialects of modern Dutch.]

## Literature

### Freshman Seminars

**109 Folk Tales and Folk Poetry** Fall and spring. 3 credits each term.

M W F 8 or T R 8:40–9:55. I. Ezergailis and staff.  
Discussion and analysis of various types of folk literature from primitive legends, myths, and ballads to contemporary literary tales. Aims to develop reading skills that can be redirected to the student's own expository writings. Readings (in English translation) range from Grimm's Fairy Tales to stories by J. R. R. Tolkien.

**151 Kafka, Hesse, Brecht, and Mann** Fall and spring. 3 credits each term.

T R 8:40–9:55. H. Deinert and staff.  
This course will be based on complete works (in English translation) by four representative German authors of the first half of the century. Although dealing with works of great popular appeal (*Demian*, *Siddhartha*, *Death in Venice*, *The Metamorphosis*, *Mother Courage*, *Galileo*, and others), the emphasis of the course will be on improving writing skills. We will meet twice a week for lectures and discussion. In lieu of a third class meeting there will be regular conferences between students and their instructors to discuss the papers.

### Courses Offered in German

**201 Introduction to German Literature I** Fall and spring. 3 or 4 credits each term. Prerequisite: qualification in German or permission of instructor. Taught in German. Fulfills both the language proficiency requirement and, followed by German 202, the humanities distribution requirement.

Fall: M W F 12:20 or T R 12:20–1:35. Spring: M W F 12:20. P. W. Nutting 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. Readings from major twentieth-century authors, including Brecht, Duerrenmatt, Frisch, Aichinger, Bachmann, Musil, and Kafka.

**202 Introduction to German Literature II** Fall and spring. 3 or 4 credits each term. Prerequisite: German 201 or permission of instructor. Taught in German.

Fall: M W F 1:25. Spring: M W F 12:20 or T R 12:20–1:35. P. W. Nutting and staff.  
An intermediate course emphasizing skills in reading and interpreting German literature, using representative texts of major nineteenth-century authors. Included will be discussions of the drama (Kleist, Buechner), lyric poetry (Goethe, Hoelderlin, the Romantics, Heine), the essay (Kleist, Heine, Marx), and the novella (Kleist, Buechner, Keller, Moerike).

**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 Seminar requirement.

T R 2:30–4:30. 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 century to the present.

**305 Modern Germany** Fall. 4 credits. Prerequisite: German 202 or equivalent. Taught in German.

T R 10:10–11:25. P. W. Nutting.  
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. Students will have the opportunity to practice their spoken and written German.

**312 Intensive Workshop in Germanic Studies for Freshmen II** Spring. 4 credits. May be used to satisfy the Freshman Seminar requirement. Taught in German.

T R 2:30–4. H. Deinert.  
Designed primarily as a sequel to German 211. Emphasis is on German literature since 1900 (T. Mann, Hesse, Kafka, Brecht, Duerrenmatt, Peter Weiss, Plenzdorf, Rilke, Benn, Celan). Supplementary reading from contemporary philosophy, psychology, sociology, and political theory.

**354 Schiller** Fall. 4 credits. Prerequisite: German 201, 202 or permission of instructor. Taught in German.

W 2:30–4:30. H. Deinert.  
A discussion of Schiller's dramas, selected poetry, and philosophical and aesthetic writing against the political and intellectual background of eighteenth-century Europe.

**[355 The Age of Goethe]** Not offered 1983–84.]

**[356 Major Works of Goethe]** Not offered 1983–84.]

**[357 Heinrich von Kleist]** Not offered 1983–84.]

**359 *Fin de Siecle* Vienna** Spring. 4 credits. Prerequisite: German 201, 202, or permission of instructor. Taught in German.

T R 12:20–1:35. S. L. Gilman.  
At the close of the last century, artists, intellectuals, and literati in Austria were aware that they stood at the end of one age and at the beginning of another. The Viennese *fin de siecle* is the resulting decade-long revolt against tradition and search to define the modern. This course will focus on short works of Kraus, Hofmannsthal, Freud, Schnitzler. Lectures in German on the intellectual background of the period.

**360 Naturalism and Feminism** Spring. 4 credits.  
Prerequisite: German 201, 202, or permission of instructor. Taught in German.

T R 8:40–9:55. C. A. Martin.  
An exploration of the relationship between Naturalism and the "woman question" as it was posed and approached in Naturalist and feminist literature at the end of the nineteenth century. We will consider representations of gender and sexuality in well-known Naturalist works, the role and writings of women within Naturalist circles, and the analyses of women's positions in Wilhelminian society by some of the leading feminists of the period. Readings will include but not be limited to Ibsen's *Nora*; Holz/Schlaef, *Die Familie Selicke*; Hauptmann's *Einsame Menschen*, *Vor Sonnenaufgang*, *Die Weber*; Gabriele Reuter's *Das Tränenhaus*, and selected poems and short essays of Lou Andreas-Salome, Laura Marholm, Gertrud Baumer, Lily Braun, Helene Stocker, Marie von Ebner-Eschenbach, and others.

**361 Kafka and Prague** Spring. 4 credits.  
Prerequisite: German 202 or permission of instructor. Taught in German.

T R 10:10–11:25. P. W. Nutting.  
Close reading and discussion of Kafka's journals, letters, and major works (*Der Prozess*, *Das Schloss*, the later tales) in the context of Kafka's biography and the social and intellectual history of Prague and Bohemia in the early twentieth century.

**[362 Modern German Literature II: Twentieth-Century Prose]** Not offered 1983–84.]

**[363 Modern German Literature III: Contemporary Literature]** Not offered 1983–84.]

**[365 Lyrical Poetry]** Not offered 1983–84.]

**374 Opera** Fall. 4 credits. Prerequisite: German 201, 202, or equivalent; good reading knowledge of German.

M W F 12:20. A. Groos.  
The same as Music 274, but with one additional meeting a week devoted to discussion of individual texts. (See also Music 374 and Theatre Arts 337.)

#### Courses in English Translation

**[314 Nietzsche, the Man and the Artist]** Not offered 1983–84.]

**[315 Topics in German Literature I: The Modern German Novel in English Translation]** Not offered 1983–84.]

**[324 Old Icelandic Literature]** Not offered 1983–84.]

**[350 Yiddish Literature in English Translation]** Not offered 1983–84.]

**[377 Topics in Yiddish Literature]** Not offered 1983–84.]

#### Graduate and Advanced Undergraduate Courses

**[405–406 Introduction to Medieval German Literature]** Not offered 1983–84.]

**[417–418 The Great Moments of German Literature I, II]** Not offered 1983–84.]

**431 Goethe's Poetry** Fall. 4 credits. Prerequisite: good reading knowledge of German. Open to undergraduate and graduate students. Short written papers at intervals during the semester; no term paper or final examination.

M 1:25–3:25. E. A. Blackall.  
An overall survey of the moods, modes, and forms of Goethe's poetry throughout the various phases of his long life. The course will include detailed analysis and discussion of all his major poems.

**433 E. T. A. Hoffmann** Spring. 4 credits.  
Prerequisite: good reading knowledge of German. Open to undergraduate and graduate students. No final examination or term paper; short written papers at intervals during the semester.

M 1:25–3:25. E. A. Blackall.  
A study of Hoffmann's achievements as a writer of novellas, with special reference to the collection entitled *Die Serapionsbrüder*. Analysis and discussion in class.

**438 German Drama after 1945** Spring. 4 credits.  
Prerequisite: permission of instructor.

R 3:35–5:35. I. Ezergailis.  
Reading of selected plays by post–World War II East and West German playwrights such as Dürrenmatt, Frisch, Handke, and Heiner Müller.

**451–452 Independent Study** 451, fall; 452, spring. 1–4 credits each term. Prerequisite: permission of instructor.

Hours to be arranged. Staff.

#### Seminars

*Note:* For complete descriptions of courses numbered 600 or above consult the appropriate instructor.

**611 Seminar in Old Icelandic Literature I (also English 602)** Fall. 4 credits.

Hours to be announced. J. C. Harris.

**612 Seminar in Old Icelandic Literature II (also English 612)** Spring. 4 credits.

Hours to be announced. J. C. Harris.

**623 Seminar in Medieval German Literature (also Medieval Studies 601)** Fall. 4 credits.

M 3:35–5:35. A. Groos.  
Topic: Arthurian Romance.

**[624 Seminar in Medieval German Literature II]** Not offered 1983–84.]

**625 The Northern Renaissance and Reformation** Fall. 4 credits.

T 1:25–3:25. S. L. Gilman.

**[627 Baroque]** Not offered 1983–84.]

**[629 The Enlightenment]** Not offered 1983–84.]

**[631 From Wilhelm Meister to Buddenbrooks]** Not offered 1983–84.]

**[632 The Age of Goethe]** Not offered 1983–84.]

**[633 Problems in Romanticism: Hölderlin and Keats (also Comparative Literature 433)]** Not offered 1983–84.]

**[635 Backgrounds of German Realism]** Not offered 1983–84.]

**[636 Nineteenth-Century Drama: Grillparzer and Hebbel]** Not offered 1983–84.]

**637 Seminar in Realism: Die Novelle** Spring. 4 credits. Prerequisite: permission of instructor.

W 3:35–5:35. H. Deinert.

**638 Contemporary German Women Writers** Fall. 4 credits.

R 3:35–5:35. I. Ezergailis.  
A close examination of selected writings, prose and poetry, by some prominent female authors in East and West Germany after World War II. Though the emphasis will be on reading the texts, the conditions for their creation and some antecedents will be surveyed. Among the authors to be considered are Christa Wolf, Ingeborg Bachmann, Gabriele Wohmann, Irmtraud Morgner, Karin Struck, and Verena Stefan.

**[639 Modern Lyric Poetry]** Not offered 1983–84.]

**[641 The Modern German Novel]** Not offered 1983–84.]

**[650 Graduate Seminar in Medieval Literature (also English 710)]** Not offered 1983–84.]

**[682 Seminar on Richard Wagner (also Music 678)]** Not offered 1983–84.]

**684 Heidegger: A Reading of Being and Time** Spring. 4 credits. Prerequisite: permission of instructor.

T 3:35–5:35. C. M. Arroyo.  
A reading of *Being and Time* that tries to reproduce the book's own logic (constructive criticism), to unveil the implicit but clear references to Marx, Husserl, Freud, etc. (instructive criticism), and to present the relevance of the book for a literary epistemology.

**753–754 Tutorial in German Literature** Fall and spring. 1–4 credits per term. Prerequisite: permission of instructor.

Hours to be arranged. Fall, P. W. Nutting; spring, staff.  
Topic for fall: Kafka and Kafka criticism.

#### Related Courses in Other Departments

**America in the World Economy (Government 354)**

**Survey of German History, 1648–1890 (History 357)**

**The European Novel (Comparative Literature 363–364)**

**Marx after 100 Years (Government 376)**

**Freud (Government 379)**

**Seminar in European Imperialism (History 450)**

**Foreign Economic Policies of Advanced Industrial States (Government 480)**

**German Social Thought (Government 669)**

**Readings in Contemporary Social Theory (Government 670)**

**Marxism and Literature (Comparative Literature 693 and English 693)**

**Gadamer's Hermeneutics (Comparative Literature 698)**

**The Hermeneutic Tradition (Comparative Literature 699)**

#### Modern Greek

See listings under Classics.

#### Modern Hebrew

See listings under Near Eastern Studies.

#### Hindi-Urdu

**101–102 Hindi-Urdu Elementary Course** 101, fall; 102, spring. 6 credits each term. Prerequisite for Hindi 102: Hindi 101 or equivalent.

M–F 9:05. G. Kelley.  
A semi-intensive course for beginners. A thorough grounding in all the language skills is given: listening, speaking, reading, and writing.

**201–202 Hindi Reading** 201, fall; 202, spring. 3 credits each term. Prerequisites: for Hindi 201, qualification in Hindi; for Hindi 202, Hindi 201 or permission of instructor.

Hours to be arranged. G. Kelley.

**203–204 Composition and Conversation** 203, fall; 204, spring. 3 credits each term. Prerequisites: for Hindi 203, qualification in Hindi; for Hindi 204, Hindi 203 or permission of instructor.

Hours to be arranged. G. Kelley.

**301–302 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.

Hours to be arranged. G. Kelley.

**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.

Hours to be arranged. G. Kelley.

**[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 1983–84.

Hours to be arranged. G. Kelley.

Intended for those who wish to do readings in history, government, economics, etc., instead of literature.]

**[401 History of Hindi]** Fall or spring. 4 credits. Prerequisite: Hindi 101–102 or equivalent, or Linguistics 102. Not offered 1983–84.

Hours to be arranged. G. Kelley.]

*Note:* For complete descriptions of courses numbered 600 and above, consult the appropriate instructor.

**[700 Seminar in Hindi Linguistics]** Fall or spring 3 credits. Prerequisite: permission of instructor. Not offered 1983–84.

Hours to be arranged. J. W. Gair and G. Kelley.]

## Indonesian

**101–102 Elementary Course** 101, fall; 102, spring. 6 credits each term. Prerequisite for Indonesian 102: Indonesian 101.

M–F 8, plus 2 more hours to be arranged.

J. U. Wolff.

A semi-intensive course for beginners.

**201–202 Indonesian Reading** 201, fall; 202, spring. 3 credits each term. Prerequisites: for Indonesian 201, qualification in Indonesian; for Indonesian 202, Indonesian 201 or permission of instructor.

Hours to be arranged. J. U. Wolff.

**203–204 Composition and Conversation** 203, fall; 204, spring. 3 credits each term. Prerequisite for Indonesian 204: Indonesian 203 or permission of instructor.

Hours to be arranged. J. U. Wolff.

**300 Linguistic Structure of Indonesian** Fall or spring. 4 credits. Prerequisites: Indonesian 101–102 or equivalent, and Linguistics 101.

Hours to be arranged. J. U. Wolff.

**301–302 Readings in Indonesian and Malay** 301, fall; 302, spring. 4 credits each term. Prerequisites: for Indonesian 301, Indonesian 201–202 or equivalent; for Indonesian 302, Indonesian 301.

Hours to be arranged. J. U. Wolff.

**303–304 Advanced Indonesian Conversation and Composition** 303, fall; 304, spring. 4 credits each term. Prerequisites: for Indonesian 303, Indonesian 204; for Indonesian 304, Indonesian 303 or equivalent.

Hours to be arranged. J. U. Wolff.

**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.

Hours to be arranged. 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.

**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.

Hours to be arranged. J. U. Wolff.

## FALCON

**161–162 Intensive Course** 161, fall; 162, spring. 16 credits each term. Prerequisite: permission of instructor.

M–F, 6 hours each day. J. U. Wolff and staff.

## Related Course

**Malayo-Polynesian Linguistics (Linguistics 655–656)**

## Italian

A. Grossvogel, director of undergraduate studies (261 Goldwin Smith Hall, 256–3580); Rachel Jacoff, G. Mazzotta (on leave 1983–84), C. Rosen

## 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. 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 203–204 and the 201–202 sequence in Italian literature 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 24 credits of Italian literature courses at the 300 level or higher, with papers to be written in Italian or English. One or more courses offered by the Department of Comparative Literature may be counted toward the required 24 credits if students obtain the prior approval of their major adviser. Italian 402, History of the Italian Language, and 403, Structure of Italian, may be counted toward the 24 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 may study in Italy, generally during their junior year, under any one of those study-abroad plans organized by American universities that allow the transfer of grades and credit, such as the Syracuse semester in Italy, in Florence.

**Fees.** Depending on the course, a small fee may be charged for copies of texts for course work.

## Language and Linguistics

**121–122 Elementary Course** 121, fall; 122, spring. 4 credits each term. Prerequisite for Italian 122: Italian 121 or equivalent. Intended for beginners or students placed by examination. Students who obtain a CPT score of 560 after Italian 121–122 attain qualification and may enter the 200-level sequence; otherwise Italian 123 is required for qualification.

Lec. T 10:10 or 12:20; drills, M W R F 8, 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. C. Rosen and staff.

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.

**123 Continuing Italian** Fall. 4 credits. Limited to students who have previously studied Italian and have a CPT achievement score between 450 and 599. Satisfactory completion of Italian 123 fulfills the qualification portion of the language requirement.

M–F 9:05 or 11:15. C. Rosen and staff.

**203–204 Composition and Conversation** 203, fall; 204 spring. 3 credits each term. Prerequisites: for Italian 203, qualification in Italian; for Italian 204, 203 or equivalent.

M W F 12:20 or 1:25. C. Rosen and staff.

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 listings under Italian 200, 201, and 202 for descriptions of these courses, any of 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.

**300 Advanced Italian: Language in Italian Culture** Spring. 3 credits. Prerequisite: Italian 204 or equivalent or permission of instructor.

M W F 11:15. C. Rosen and staff.

Further development of all skills, with emphasis on self-expression. Readings center on two themes (1) contemporary Italian life, its trials and joys, as seen by the satirical columnist Luca Goldoni and others; (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.

**[402 History of the Italian Language]** Spring. 4 credits. Prerequisite: Linguistics 101 (or equivalent), and qualification in Italian, or permission of instructor. Not offered 1983–84.]

**403 Linguistic Structure of Italian** Fall. 4 credits. Prerequisite: Linguistics 102 and qualification in any Romance language. Offered alternate years.

M W F 2:30. C. Rosen.

Survey of Italian grammar in the light of current linguistic theories. Emphasis is on syntax. Selected topics in phonology, word formation, and semantics.

**[432 Italian Dialectology]** Spring, according to demand. 4 credits. Not offered 1983–84. C. Rosen.]

**[700 Seminar in Italian Linguistics]** Offered according to demand. 4 credits. Not offered 1983–84. C. Rosen.]



## Literature

**201 Introduction to Medieval and Renaissance Literature** 3 credits. Prerequisite: reading knowledge of Italian.

M W F 12:20. A. Grossvogel and staff.  
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, Cavalcanti, 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*.

**202 Introduction to Modern Italian Literature** 3 credits. Prerequisite: reading knowledge of Italian.  
M W F 12:20. A. Grossvogel and staff.

A reading of masterpieces of modern Italian literature with attention to the context in which they arose. Highlights of Galileo and Vico's writing. Selections of novels from romanticism to the contemporary period. The theater of Goldoni and Pirandello. Poetry from Leopardi to Montale.

**[322 Italian Civilization: Literature and Regionalism** Not offered 1983–84.]

**[326 Twentieth-Century Novel** Not offered 1983–84]

**[327–328 Dante: *La Divina Commedia*** 327, fall; 328, spring. Not offered 1983–84.]

**334 Dante in Translation (also Comparative Literature 344)** Spring. 4 credits.  
M W F 10:10. R. Jacoff.

The *Divine Comedy* is at once a paradigmatic and an exceptional poem. This course will serve as an introduction to the *Comedy*. We will read the entire poem, analyzing selected cantos to articulate the poem's major structural aspects and thematic concerns. The emphasis will be on Dante's shaping of his text, his reinterpretation of his most important literary and philosophical sources, and his progressive unfolding of his own literary, moral, and political vision.

**[335 Boccaccio** Not offered 1983–84.]

**[336 Boccaccio** Not offered 1983–84.]

**[345 Modern and Contemporary Short Fiction in Italy** Not offered 1983–84.]

**[347 Petrarch and the Renaissance Lyric** Not offered 1983–84.]

**[353 Vico and the Renaissance Esthetics** Not offered 1983–84.]

**[359–360 The Italian Renaissance** Not offered 1983–84.]

**[366 Seventeenth-Century Prose** Not offered 1983–84.]

**[370 Eighteenth-Century Thought** Not offered 1983–84.]

**[371 Goldoni and Alfieri: From Comedy to Tragedy** Not offered 1983–84]

**381 The Theater of Verga, D'Annunzio, Svevo, and Pirandello (also Italian 681)** Spring. 4 credits.  
W 2:30–4:25. A. V. Grossvogel.

A reading of the major dramatic productions of these authors and an examination of the relationship of theater to narrative in converging literary movements such as "Verismo," "Decadentismo," and Symbolism of Avant-garde.

**[387 Nineteenth Century Poetry: Leopardi** Not offered 1983–84]

**[390 Contemporary Narrative in Italy** Not offered 1983–84.]

**393 Narrative and Ideology in Contemporary Italian Literature (also Italian 593 and Comparative Literature 393)** Fall. 4 credits. The course will be taught either in English or Italian, according to demand.

T R 10:10–11:25. A. V. Grossvogel.  
The social, political, and economic frustrations of the south and the alienating effects of industrialization in the north, as reflected in postwar Italian narrative. Works by Calvino, Sciascia, Pavese, Vittorini, Levi, Volponi, Balestrini, Gadda, and Moravia will be read. Most of the texts are available in translation.

**395 Literature to Cinema, Cinema to Literature (also Comparative Literature 392)** Fall. 4 credits  
T R 12:20–1:35. A. V. Grossvogel.

A study of the ways literary language has influenced Italian cinema and the ways film language has had an impact on contemporary poetry and prose fiction. The films to be screened will be by Antonioni, Bertolucci, Bolgnini, De Sica, Fellini, Pasolini, Soldati, Scola, Taviani, Visconti, Zeffirelli, 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 by Verga, Fogazzaro, D'Annunzio, Pirandello, Pavese, Pratolini, Moravia, Bassani, Calvino, Buzzati, and Ledda.

**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.

**[428 Eugenio Montale and Half a Century of Italian Poetry** Spring. 4 credits. Not offered 1983–84.]

**429–430 Honors in Italian Literature (also Italian 628)** 429, fall; 420, spring. 4 credits each term. Limited to seniors. Prerequisite: permission of instructor.  
Staff.

**[437 Petrarch: *Canzoniere*** Not offered 1983–84]

**[472 Eighteenth-Century Theater** Not offered 1983–84.]

**[485 The Nineteenth Century: *I promessi sposi*** Not offered 1983–84.]

**[486 The Nineteenth Century** Not offered 1983–84.]

**[488 Giacomo Leopardi and Modern Italian Poetry in the Nineteenth Century** Not offered 1983–84.]

**496 Futurism in Italy and Europe** Spring. 4 credits.  
T R 2:30–3:45. A. V. Grossvogel.

The narrative, poetic, and dramatic works of the Italian Futurists will be compared and contrasted with their manifestos, critical writings, and propaganda. The literary production of the Futurists will be considered within the wider scope and resonance of the concomitant manifestations in the visual arts. Attention will be given to the attempts of the time to reach a new synthesis of artistic expression involving not only literature but also painting, sculpture, photography, cinematography, architecture, and stage settings. Finally the movement would be seen within the context of European avant-garde: Cubism, Cubo-futurism, Orphism, and Corticism.

**[527 Dante: *La Divina Commedia*** Not offered 1983–84]

**593 Narrative and Ideology in Contemporary Literature (also Italian 393 and Comparative Literature 393)** Fall.

T R 10:10–11:25. A. V. Grossvogel.  
For description see Italian 393.

**[635 Boccaccio** Not offered 1983–84]

**639–640 Special Topics in Italian Literature** 639, fall; 640, spring. 4 credits each term.  
Staff.

**656 Medieval Italian Lyric** Spring. 4 credits. Prerequisite: reading knowledge of Italian.  
M 2:30–4:25. R. Jacoff.

A study of the origins and development of early Italian lyric, with particular attention to the "Sicilian" poets, Bonagiunta da Lucca, Guittone d'Arezzo, Guido Guinizelli, and Guido Cavalcanti. We will look closely at the development of forms such as the sonnet and the canzone and at the poetic debates that took place during this period. We will end by reading the *Vita Nuova* as a commentary on the lyric tradition.

**681 The Theater of Verga, D'Annunzio, Svevo, and Pirandello** Spring.  
W 2:30–4:25. A. V. Grossvogel.  
For description see Italian 381.

**[685 The Nineteenth Century: *I Promessi Sposi*** Not offered 1983–84.]

## Related Courses in Other Departments

**Studies in the Lyric: Dante, Scève, and Yeats (Comparative Literature 411/611)**

**The Rhetoric of Renaissance Humanism (Society for the Humanities 421–422)**

## Japanese

## Language and Linguistics

**101–102 Elementary Course** 101, fall; 102, spring. 6 credits each term. Prerequisite for Japanese 102: Japanese 101 or permission of instructor. Intended for beginners or for those who have been placed in the course by examination.  
Lecs, M W F 10:10; drills, M–F 9:05, 11:15, 12:20, or 2:30. E. H. Jorden and staff.  
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

**123 Accelerated Introductory Japanese** Fall. 6 credits. Prerequisite: permission of instructor.  
Lecs, M W F 10:10 (with Japanese 101); drills, M W F 12:20. E. H. Jorden and staff.  
Accelerated training in listening, speaking, reading, and writing for students who have already acquired a limited facility in Japanese through residence in Japan or brief formal study but who require additional training to qualify for admission to Japanese 102.

**141–142 Introductory Japanese for Business Purposes** 141, fall; 142, spring. 4 credits each term. Prerequisite for Japanese 142: Japanese 141 or permission of instructor. (For undergraduates only. Graduates, see Japanese 541–542.)  
M–F 1:25. E. H. Jorden and staff.  
Introductory Japanese for students interested in international business and economics.

**201–202 Intermediate Japanese I** 201, fall; 202, spring. 3 credits each term. Prerequisites: for Japanese 201, Japanese 203 or permission of instructor; for Japanese 202, Japanese 201 and 203 or 204 or permission of instructor.  
Lecs, M W F 1:25; drill, W 10:10 or 2:30 (with Japanese 205–206). Staff.  
Reading of elementary texts with emphasis on expository style.

**203–204 Japanese Conversation** 203, fall; 204, spring. 4 credits each term. Prerequisites: for Japanese 203, Japanese 102 or permission of instructor; for Japanese 204, Japanese 203 or 205 or permission of instructor.

Lecs, M W 1:25; drills, M T R F 10:10 or 2:30 (with Japanese 205–206). Staff.

Training in listening and speaking for students who have acquired a basic oral proficiency.

**205–206 Intermediate Japanese I and Conversation** 205, fall; 206, spring. 6 credits each term. Prerequisites: for Japanese 205, Japanese 102 or permission of instructor; for Japanese 206, Japanese 205 or permission of instructor.

Lecs, M W F 1:25; drill, M–F 10:10 or 2:30. Staff. A combination of Japanese 201–202 and 203–204, for students interested in developing both written and oral skills.

**241–242 Intermediate Japanese for Business**

**Purposes** 241, fall; 242 spring. 4 credits each term. Prerequisites: for Japanese 241, Japanese 142 or permission of instructor; for Japanese 242, Japanese 241 or permission of instructor. (For undergraduates only. Graduates, see Japanese 543–544.)

Hours to be arranged. E. H. Jorden and staff.

Intermediate Japanese for students in international business and economics.

**301–302 Intermediate Japanese II** 301, fall; 302, spring. 4 credits each term. Prerequisites: for Japanese 301, Japanese 202 or 206 or permission of instructor; for Japanese 302, Japanese 301 or permission of instructor.

M W F 2:30; lec to be arranged. Staff.

Reading of selected modern texts with emphasis on expository style.

**303–304 Communicative Competence** 303, fall; 304, spring. 3 credits each term. May be repeated for credit. Prerequisite for Japanese 303, Japanese 204 or 206 or permission of instructor; for Japanese 304, Japanese 303 or permission of instructor.

M W F 1:25. E. H. Jorden and staff.

Drill in the use of spoken Japanese within the constraints set by Japanese social settings.

**401–402 Advanced Japanese** 401, fall; 402, spring. 4 credits each term. Prerequisites: for Japanese 401, Japanese 302 or permission of instructor; for Japanese 402, Japanese 401 or permission of instructor.

M W F 2:30; lec to be arranged. Staff.

Reading of selected modern texts with emphasis on expository style.

**[404 Linguistic Structure of Japanese** Spring. 4 credits. Prerequisites: Japanese 102 or permission of instructor, and Linguistics 101. Not offered 1983–84.

Hours to be arranged. E. H. Jorden.]

**407–408 Oral Narration and Public Speaking** 407, fall; 408, spring. 2 credits each term. May be repeated for credit. Prerequisite for 408, Japanese 407 or permission of instructor; for 407, Japanese 304 or permission of instructor.

T R 1:25. Staff.

Instruction in storytelling, lecturing, and speechmaking, with emphasis on both the construction of discourse and Japanese patterns of oral delivery.

**421–422 Directed Readings** 421, fall; 422, spring. Credit to be arranged. Prerequisite: permission of instructor.

Hours to be arranged. Staff.

Topics are selected on the basis of students needs.

**541–542 Introductory Japanese for Business**

**Purposes** For graduate students only; undergraduates register for Japanese 141–142.

M–F 1:25.

See Japanese 141–142 above.

**543–544 Intermediate Japanese for Business**

**Purposes** For graduate students only; undergraduates register for Japanese 241–242. See Japanese 241–242 above.

## FALCON

**161–162 Intensive Japanese (FALCON)** 161, fall; 162, spring. 16 credits each term. Prerequisite: permission of instructor.

M–F, 6 hours each day. E. H. Jorden and staff.

## Literature in Japanese

**405 Introduction to Modern Literary Japanese**

Fall. 4 credits. Prerequisite: Japanese 302 or permission of instructor.

B. deBary.

Readings of selected works of modern Japanese literature.

**406 Introduction to Classical Japanese** Spring. 4 credits. Prerequisite: Japanese 405 or permission of instructor.

K. Brazell.

An introduction to the grammar and styles of premodern Japanese. Selected readings from literature of various periods.

**421–422 Directed Readings** 421, fall; 422, spring. Credit to be arranged. Prerequisites: for Japanese 421, Japanese 402 or equivalent; for Japanese 422, Japanese 421 or equivalent.

Hours to be arranged. Staff.

Topics are selected on the basis of student needs.

*Note:* For complete descriptions of courses numbered 600 or above, consult the appropriate instructor.

**611 Seminar in Modern Literature** Fall or spring on demand. 2–4 credits. Prerequisite: permission of instructor.

Hours to be arranged. B. deBary.

**612 Seminar in Classical Literature** Fall or spring on demand. 2–4 credits. Prerequisite: permission of instructor.

Hours to be arranged. K. Brazell.

**621–622 Advanced Directed Readings** 621, fall; 622, spring. Credit to be arranged. Prerequisite: permission of instructor.

Hours to be arranged. Staff.

*Note:* See courses listed under Department of Asian Studies for Japanese literature courses in translation.

## Javanese

**131–132 Elementary Course** 131, fall; 132, spring. 3 credits each term. Prerequisites: for Javanese 131, qualification in Indonesian; for Javanese 132, Javanese 131 or equivalent.

Hours to be arranged. J. U. Wolff.

An elementary language course for those who have had no previous experience in the language.

**133–134 Intermediate Course** 133, fall; 134, spring. 3 credits each term. Prerequisites: for Javanese 133, Javanese 132 or equivalent; for Javanese 134, Javanese 133 or equivalent.

Hours to be arranged. J. U. Wolff.

**203–204 Directed Individual Study** 203, fall; 204, spring. 3 credits. Prerequisite: Javanese 134 or equivalent.

Hours to be arranged. J. U. Wolff.

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.

## 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. In theory, the gulf between the study of language in general and the study of particular languages, such as Spanish or German, is very wide; in practice, however, the two are intimately connected, and a high proportion of the students who enroll in linguistics courses at Cornell owe their initial interest in the discipline to a period of exposure to a foreign language in college or high school.

There are two introductory course sequences in linguistics: 111–112, which stresses the relationship of linguistics to other disciplines in the humanities and social sciences, and 101–102, which is designed for language majors, linguistics majors, and others who think that they may wish to do further work in the subject. The Cornell Linguistic Circle, a student organization, sponsors weekly 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 major in linguistics has three prerequisites: (1) completion of Linguistics 101–102, (2) qualification in two languages, one from the familiar European group (Latin, Greek, French, Italian, Portuguese, Spanish, German, Russian) and one from the other languages offered at Cornell, and (3) 6 credits of course work beyond qualification in one of the languages studied. Some students may be unable to attain qualification in a non-European language before entering the major, in which case the requirement may be completed after admission to the major.

Completion of the major requires:

- 1) Linguistics 301, 310, and 303;
- 2) 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;
- 3) a course in historical method, such as Linguistics 404, 410, or the history of a specific language or family; and
- 4) a minimum of 8 additional credits in linguistics chosen in consultation with the student's adviser. With the adviser's approval, 4 such credits may be in a course in a related discipline with a significant linguistic component, such as psycholinguistics, language acquisition, or anthropological linguistics.

Prospective majors should see Professor Gair, 407 Morrill Hall. For other courses relevant to linguistics, see anthropology, psychology, human development and family studies, computer science, and philosophy.

**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 either Linguistics 101 or 111 and (1) any other course in linguistics or (2) any other course offered by the Department of Modern Languages and Linguistics for which one of these introductory linguistics courses is a prerequisite.

See also Modern Languages, Literatures, and Linguistics, pp. 151–152.

**100 Traditional English Grammar for Foreign Language Students** Fall. 1 credit. Open only to students concurrently enrolled in a foreign language course. S-U grades only.

W 12:20 or R 9:05. H. L. Kufner.  
Rapid review of grammatical terminology and those features and processes of English that are of particular relevance and usefulness in the learning of French, German, Italian, Russian, or Spanish. Weekly homework assignments; no prelims; no final examinations.

**101–102 Theory and Practice of Linguistics** 101, fall; 102, spring. 4 credits each term.

M W F 9:05; disc to be arranged. Staff.  
An introductory course designed primarily for those who intend to major in a language or in general linguistics. (See Linguistics 111–112 for a course designed for nonmajors.) 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.

**111 Themes in Linguistics** Fall. 4 credits.  
Intended primarily for nonmajors. (Prospective linguistics majors should see Linguistics 101–102.)

M W F 10:10. Staff.  
Basic linguistic concepts are introduced and the relationship of linguistics to other disciplines is explored, with emphasis on biological, psychological, social, and cultural contexts of language use. This course together with any other linguistics course other than 101 satisfies the social science distribution requirement.

**113–114 Hispanic Bilingualism** 113, fall; 114, spring. 3 credits each term. Linguistics 113 is not a prerequisite for 114. Freshman Seminar.

M W F 1:25. I. Almirall-Padamee, D. F. Solá.  
An introductory sociolinguistics course on the English language as used in Spanish-English bilingual communities. Fall semester topics include linguistic interference, code-switching, generational differences, and variation related to social function. Spring semester topics concentrate on variation in the use of Spanish and English in the different Hispanic communities established in the United States.

**201 Phonetics** Fall. 3 credits.

T R 8:30–9:45. J. E. Grimes.  
Introductory-level study of practical and theoretical aspects of phonetics; emphasis on identifying, producing, and transcribing speech sounds.

**202 Instrumental Phonetics** Spring. 3 credits. Prerequisite: Linguistics 201.

T R 8:30–9:45. J. E. Grimes.  
Intermediate-level study of practical, experimental, and theoretical aspects of articulatory and acoustic phonetics.

**[205 Understanding the Language of Television Images]** Fall. 4 credits. Not offered 1983–84.  
T R 9:05, M 2:30. L. Waugh and R. Goldsen.  
TV images convey connotative and denotative

meanings that are widely understood. How do we read these images? What is the underlying, grammar-like structure that arranges them as signs and symbols in a shared meaning system? Using the techniques and concepts of content analysis (from sociology) and semiotics (from linguistics), we will decode images in product commercials.]

**244 Language and the Sexes (also Women's Studies 244)** Spring. 4 credits. Prerequisites: Linguistics 101 or 111, or Psychology 215, or permission of instructor.

M W F 1:25. Staff.

**264 Language, Mind, and Brain** Spring. 4 credits. For nonmajors or majors.

T R 2:30–3:45. J. S. Bowers.  
A survey of what is currently known about the structure and function of natural language, with emphasis on the following topics: the basic biology of language, language acquisition, processing models, theories of mental representation and universal grammar, language and cognition.

**300 Multilingual Societies and Cultural Policy** Spring. 4 credits.

T R 2:30–4. D. F. Solá.  
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.

**301–302 Phonology I–II** 301, fall; 302, spring. 4 credits each term. Prerequisite for 302: Linguistics 301.

T R 2:30–3:45. G. N. Clements.  
A general survey of phonemics and of Jakobsonian distinctive feature theory, as well as selected other topics in autonomous phonology.

**303–304 Syntax I, II** 303, fall; 304, spring. 4 credits each term. Prerequisite for Linguistics 304; Linguistics 303.

T R 10:10–11:25. J. S. Bowers.  
303 introduces the theory of syntax within a generative-transformational framework. 304 is an advanced course on syntax and the relation of syntax to semantics.

**306 Functional Syntax** Fall. 4 credits. Prerequisite: Linguistics 102 or permission of instructor.

M W F 9:05. D. F. Solá.  
A general survey of syntactic theories that highlight grammatical function and reveal its role in discourse structure.

**[308 Dialectology]** Spring. 4 credits. Offered alternate years.

Hours to be arranged. Staff.  
Methods and procedures of dialectological study with introduction to the major dialect atlases.]

**310 Morphology** Spring. 4 credits. Prerequisite: Linguistics 101 or 111 or the equivalent.

M W 2:30–3:45. L. R. Waugh.  
A general survey focusing on the relationship of meaning and form in morphology.

**311–312 The Structure of English** 311, fall; 312, spring. 4 credits each term. Prerequisites: for Linguistics 311, Linguistics 102 or permission of instructor; for Linguistics 312, Linguistics 311 or permission of instructor.

M W F 11:15. 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.

**313 English for Teachers of English** Fall. 4 credits. Prerequisite: for undergraduate majors, Linguistics 101–102 or equivalent; for graduate

students, concurrent registration in Linguistics 101 or equivalent.

T R 12:20–1:50. M. Martin.

A course in modern English for teachers of nonnative speakers. An analysis of the phonetics, grammar, and semantics of the language in terms applicable to both classroom teaching and materials development.

**314 Teaching English as a Foreign Language** Spring. 4 credits. Prerequisites: Linguistics 313.

T R 12:20–1:50. M. Martin.  
Methods and techniques used in the teaching of English language skills to nonnative speakers are examined. Attention is given to materials design and to current issues and new trends in the fields.

**318 Style and Language** Spring. 4 credits. Prerequisite: Linguistics 101 or permission of instructor.

T R 1–2:15. G. M. Messing.

**[341 India as a Linguistic Area]** Fall. 4 credits. Prerequisite: Linguistics 102 or permission of instructor.

Hours to be arranged. J. W. Gair, G. Kelley.  
Cross-family influences in an area of interaction over a long time span are considered. No knowledge of Indian languages is expected.]

**400 Semiotics and Language** Fall. 4 credits. Prerequisites: a background in linguistics, anthropology, or literary theory, or permission of instructor.

M W 2:30–3:45. L. R. Waugh.  
An introduction to the study of semiotics in general and to particular semiotic theories (for example, those of Saussure, Perrie, Jakobson) and to language as a semiotic system.

**401 Language Typology** Fall. 4 credits. Prerequisite: Linguistics 101–102 or equivalent.

M W F 11:15. C. Rosen.  
Study of a basic question of contemporary linguistics: in what ways do languages differ, and in what ways are they all alike? Efforts to characterize the total repertory of constructions available to natural languages. Common morphological devices and their syntactic correlates. Emphasis on two approaches to universals: (1) relational grammar; (2) the work of Joseph Greenberg.

**[402 Languages in Contact]** Fall. 4 credits. Prerequisite: Linguistics 101–102 or permission of instructor. Offered alternate years.

M W F 9:05. H. L. Kufner.  
Examination of a variety of areas where languages exhibit interference phenomena: diglossia, bilingualism, dialects, second-language acquisition.]

**403 Applied Linguistics and Second-Language Acquisition** Spring. 4 credits. Prerequisite: a course in the structure of a language at the 400 level.

T R 10:10–11:25. J. S. Noblitt.  
Examination of the theoretical bases of applied linguistics, including current language-teaching methodologies.

**404 Comparative Methodology** Fall. 4 credits. Prerequisite: Linguistics 101 or permission of instructor.

Hours to be arranged. R. B. Jones.  
Exemplification of the methods of comparative reconstruction of proto-languages, using problems selected from a variety of language families; methods of evaluating reconstructions.

**[405–406 Sociolinguistics]** 405, fall; 406, spring. 4 credits each term. Prerequisites: Linguistics 101–102 or 111–112 or permission of instructor. Linguistics 405 is not a prerequisite to 406. Not offered 1983–84.

T R 2:30–3:45. J. U. Wolff.  
Social influences (ethnic, socioeconomic, educational) on linguistic behavior, shifts in register, style, dialect, or language in different speech situations.]

**410 Historical Linguistics: Methods and Approaches** Spring. 4 credits. Linguistics 102 or permission of instructor.

T R 12:20. J. Jasanoff.

A survey of the basic mechanisms of linguistic change, with special attention to comparative and internal reconstruction.

**415-416 Social Functions of Language** 415, fall; 416, spring. 4 credits each term. Prerequisites: Linguistics 101 or 111, or permission of instructor.

Hours to be arranged. G. Kelley.

The function of language in society; social constraints on linguistic behavior, including taboos, jargons, registers, social and socially perceived dialects.

**417 History of the English Language** Fall. 4 credits. Prerequisite: permission of instructor.

M W F 1:25. G. Kelley.

Development of modern English; external history; phonological, grammatical, and lexical change. The English language in America.

**421 Linguistic Semantics** Spring. 4 credits. S. McConnell-Ginet.

**[436 Language Development (also Psychology 436 and Human Development and Family Studies 436)]** Spring. 3 or 4 credits. Prerequisites: at least one course in cognitive psychology, cognitive development, or linguistics. Offered alternate years.

Not offered 1983-84; next offered 1984-85. T R 10:10-12:05. B. Lust.

A survey of basic literature development. Major theoretical positions in the field are considered in the light of studies in first-language acquisition of phonology, syntax, and semantics from infancy onward. The fundamental issue of relations between language and cognition will be discussed. The acquisition of communication systems in nonhuman species such as chimps, and problems of language pathology will also be addressed, but main emphasis will be on normal language development in the child.]

**[440 Dravidian Structures]** Fall or spring, according to demand. 4 credits. Prerequisite: Linguistics 102.

Hours to be arranged. G. Kelley.

A comparative and contrastive analysis of the structures of several Dravidian languages.]

**442 Indo-Aryan Structures** Fall or spring, according to demand. 4 credits. Prerequisite: Linguistics 102.

Hours to be arranged. J. W. Gair.

Typological discussion of the languages of the subfamily, phonology and grammar.

**493 Honors Thesis Research** Fall. 4 credits. Hours to be arranged. Staff.

May be taken before or after Linguistics 494, or may be taken independently.

**494 Honors Thesis Research** Spring. 4 credits. Hours to be arranged. Staff.

May be taken as a continuation of, or before, Linguistics 493.

**600 Field Methods** Fall or spring. 4 credits. Prerequisites: Linguistics 101 or 201.

Hours to be arranged. G. N. Clements, F. E. Huffman.

Elicitation, recording, and analysis of data from a native speaker of a language not generally known to students.

**602 Proseminar: Introduction to Graduate Study** Spring. 4 credits. Primarily for first-year graduate students majoring in general linguistics, but, with permission of instructor, open to those minoring in linguistics or majoring in the linguistics of specific languages.

M W F 10:10 and M 3:35. Staff.

A survey of the major subareas of linguistics. Emphasis is on basic concepts, current issues and

their background, and methodology, with discussions and data-oriented problems based on extensive readings.

**603 History of Linguistics** Fall. 4 credits.

T R 1-2:15. G. M. Messing.

The history of linguistics from early Greek and Sanskrit grammarians to the modern period.

**[607 Schools of Linguistics]** Fall. 4 credits.

Prerequisites: Linguistics 102 or 602 and permission of instructor. Not offered 1983-84.

Hours to be arranged. J. E. Grimes.

Readings and descriptions of major contemporary schools of linguistic thought in the twentieth century.]

**608 Discourse Analysis** Spring. 4 credits.

Prerequisite: permission of instructor.

Hours to be arranged. J. E. Grimes.

Linguistic theory applied to relationships beyond the sentence.

**610 Topics in Transformational Grammar** Fall or spring. 3 credits. Prerequisite: permission of instructor.

Hours to be arranged. J. S. Bowers.

A survey of the development and current state of generative grammatical theory.

**621-622 Hittite** 621, fall; 622, spring. 4 credits

each term. Prerequisites: for Linguistics 621,

permission of instructor; for Linguistics 622, Linguistics 621 or permission of instructor.

Hours to be arranged. J. Jasanoff.

**[631-632 Comparative Indo-European**

**Linguistics]** 631, fall; 632, spring. 4 credits each term. Prerequisites: for Linguistics 631, permission of instructor, for Linguistics 632; Linguistics 631 or permission of instructor. Not offered 1983-84.

J. Jasanoff.

Fall: Introduction to phonology, branches of the family. Spring: Grammar.]

**640 Elementary Pali** Fall or spring, according to demand. 3 credits.

Hours to be arranged. J. W. Gair.

An introduction to the language of the canonical texts of Theravada Buddhism. Reading of authentic texts, with emphasis on both content and grammatical structure.

**641-642 Elementary Sanskrit** 641, fall; 642,

spring. 3 credits each term. Prerequisite for Linguistics 642: Linguistics 641.

Hours to be arranged. G. Messing.

**651-652 Old Javanese** Fall or spring, according to demand. 4 credits.

Hours to be arranged. J. U. Wolff.

Grammar and reading of basic texts.

**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.

Hours to be arranged. R. B. Jones.

Languages of mainland Southeast Asia. Topics, chosen according to student interests, may include description, dialectology, typology, comparative reconstruction, and historical studies.

**655-656 Seminar in Malayo-Polynesian**

**Linguistics]** 655, fall; 656, spring. 4 credits each term. Prerequisites: for Linguistics 655, Linguistics 102 and permission of instructor; for Linguistics 656, Linguistics 655.

Hours to be arranged. J. U. Wolff.

Descriptive and comparative studies of Malayo-Polynesian languages.

**[657-658 Seminar in Austroasiatic Linguistics]**

657, fall; 658, spring. 4 credits each term.

Prerequisites: Linguistics 102 and permission of instructor.

Hours to be arranged. F. E. Huffman. Descriptive and comparative studies of Austroasiatic languages.]

**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.

**701-702 Directed Research** 701, fall; 702, spring. 1-4 credits.

Hours to be arranged. Staff.

**751 Thai Dialectology** Fall. 4 credits.

Prerequisites: Linguistics 303 and permission of instructor.

Hours to be arranged. R. B. Jones.

Geographical distribution of the Thai languages and methods of classifying and subgrouping.

**752 Comparative Thai** Spring. 4 credits.

Prerequisites: Linguistics 404 or equivalent, and permission of instructor.

Hours to be arranged. R. B. Jones.

Comparative reconstruction of Proto-Thai, including various points of view and criteria for subgrouping.

**753 Tibeto-Burman Linguistics** Fall. 4 credits.

Prerequisites: Linguistics 404 or equivalent, and permission of instructor.

Hours to be arranged. R. B. Jones.

Comparative reconstruction of Tibeto-Burman, with emphasis on the Lolo-Burmese branch and historical study of Burmese.

## Pali

See Linguistics 640.

## Polish

**[131-132 Elementary Course]** 131, fall; 132, spring. 3 credits each term. Prerequisite for Polish 132: Polish 131 or equivalent. Not offered 1983-84. M W F 9:05. Staff.]

**133-134 Intermediate Course** 133, fall; 134, spring. 3 credits each term. Prerequisites: for Polish 133, Polish 132 or equivalent; for Polish 134, Polish 133 or equivalent.

Hours to be arranged. E. W. Browne.

## Portuguese

**121-122 Elementary Course** 121, fall; 122, spring. 4 credits each term. Intended for beginners or for those who have been placed in the course by examination. Students may attain qualification upon completion of 122 by achieving a satisfactory score on a special examination.

M-F 10:10 or 11:15. Staff.

A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

**203-204 Intermediate Composition and**

**Conversation** 203, fall; 204, spring. 3 credits each term. Prerequisites: for Portuguese 203, qualification in Portuguese; for Portuguese 204, Portuguese 203 or permission of instructor.

M W F 12:20. Staff.

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.

**[303–304 Advanced Composition and Conversation]** 303, fall; 304, spring. 4 credits each term. Prerequisite: for Portuguese 303, Portuguese 204 or equivalent; for Portuguese 304, Portuguese 303 or equivalent. Not offered 1983–84.  
M W F 11:15. Staff.]

**305–306 Readings in Luso-Brazilian Culture** 305, fall; 306, spring. 4 credits each term. Prerequisites: Portuguese 204 or equivalent or permission of instructor.  
M W F 1:25. Staff.

**[700 Seminar in Portuguese Linguistics]** Fall or spring, according to demand. 4 credits. Not offered 1983–84.  
Hours to be arranged. Staff.  
Selected problems in the structure of Portuguese.]

## Quechua

**131–132 Elementary Course** 131, fall; 132, spring. 3 credits each term. Prerequisite: qualification in Spanish.  
M W F 11:15. D. F. Solá.  
A beginning conversation course in the Cuzco dialect of Quechua.

**133–134 Intermediate Course** 133, fall; 134, spring. 3 credits each term. Prerequisites: for Quechua 133, Quechua 131–132 or equivalent; for Quechua 134, Quechua 133 or equivalent.  
Hours to be arranged. D. F. Solá.  
An intermediate conversation and reading course. Study of the Huarochiri manuscript.

**700 Seminar in Quechua Linguistics** Fall or spring. Credit to be arranged. Prerequisite: permission of instructor.  
Hours to be arranged. D. F. Solá.

## Romance Linguistics and Literature

### Linguistics

**[321–322 History of the Romance Languages]** 321, fall; 322, spring. 4 credits each term. Prerequisite for Romance Studies 322: Romance Studies 321. Offered alternate years. Not offered 1983–84.  
Staff.

Diachronic development of the Romance languages from Latin, with emphasis on Spanish, French, Italian, and Romanian. 321 concentrates on external history and phonological changes; 322 concentrates on morphological and syntactic developments.]

**323 Comparative Romance Linguistics** Spring. 4 credits. Prerequisite: Linguistics 101 (or equivalent) and qualification in any Romance language.  
Hours to be arranged. C. Rosen.  
Basic characteristics of the Romance language family. Salient features of eight Romance languages; broad and localized trends in phonology, syntax, and the lexicon, elements of dialectology.

**[620 Area Topics in Romance Linguistics]** Spring. 4 credits. May be repeated for credit. Not offered 1983–84; next offered 1984–85.  
Hours to be arranged. J. S. Noblitt.]

**[621 Problems and Methods in Romance Linguistics]** Spring. 4 credits. Prerequisite: Linguistics 401 or permission of instructor. Not offered 1983–84.  
Hours to be arranged. C. Rosen.  
Central topics in Romance syntax in the light of current theories of universal grammar.]

**[622 Romance Dialectology]** Spring. 4 credits. Offered every third year. Not offered 1983–84.  
Diachronic and synchronic survey of dialects of the Romance language areas.]  
See also Classics 423 (Vulgar Latin).

### Literature

**109 Freshman Seminar: Techniques of Interpretation: An Introduction to Semiotics (also French 109)** Fall and spring. 3 credits.  
T R 8:40–9:55. K. Lockhart.  
See description under French Literature.

**[303 Isms: General Concepts in Modern Cultural History (also Comparative Literature 303)]** Not offered 1983–84.]

**[355 The Picaresque Novel in a European Perspective (also Comparative Literature 355)]** Not offered 1983–84.]

**[459 Being, God, Mind: Key Terms of Western Thought from Plato to Vico (also Comparative Literature 359)]** Not offered 1983–84.]

**[460 Biology and Theology: Approaches to the Origin of Life, Evolution, Heritage and Freedom, Sexuality and Death (also Comparative Literature 460)]** Not offered 1983–84.]

### Related Course in Another Department

**The Hermeneutic Tradition (Comparative Literature 699)**

### Romanian

**131–132 Elementary Course** 131, fall; 132, spring. Offered according to demand. 3 credits. Prerequisite for Romanian 132: Romanian 131 or equivalent.

**133–134 Elementary Course II** 133, fall; 134, spring. Offered according to demand. 3 credits. Prerequisite for Romanian 134: Romanian 133 or equivalent.

### Russian

L. H. Babby, E. W. Browne, P. Carden, C. Emerson, G. Gibian, R. L. Leed (director of undergraduate studies [language]), 302 Morrill Hall, 256-2322), N. Perlina, P. Schmidt, S. Senderovich (director of undergraduate studies [literature]), 194 Goldwin Smith Hall, 256-4047), I. Serman, A. Zholkovsky

### 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 Senderovich 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 Russian literature in the original language.

**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 Seminar Requirement.** The following courses will satisfy the Freshman Seminar requirement: Russian 103, 104, and 105.

### Russian and Soviet Studies Major

See Special Programs and Interdisciplinary Studies, which follows the department listings.

### Language and Linguistics

**101–102 Elementary Courses** 101, fall; 102, spring. 6 credits each term. Prerequisite for Russian 102: Russian 101 or equivalent. Intended for beginners or students placed by examination and those who wish to obtain qualification within two semesters or who wish to enter the 200-level sequence the following fall semester.

Lecs, T R 11:15 or T R 2:30; drills M–F 9:05, 12:20, or 1:25. R. L. Leed and staff.  
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing. Language practice is in small groups. Lectures cover grammar, reading, and cultural information.

**121–122 Elementary Course** 121, fall; 122, spring. 4 credits each term. Prerequisite for Russian 122: Russian 121 or equivalent. Intended for beginners or students placed by examination. Students who obtain a CPT achievement score of 560 after Russian 121–122 attain qualification and may enter the 200-level sequence; otherwise Russian 123 is required for qualification.

Lec, T 2:30; drills, M W R F 8 or 2:30. Staff.  
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing. Language practice is in small groups. Lectures cover grammar, reading, and cultural information.

**123 Continuing Russian** Fall. 4 credits. Limited to students who have previously studied Russian and have a CPT achievement score between 450 and 559. Satisfactory completion of Russian 123 fulfills the qualification portion of the language requirements.  
M–F 3:35. Staff.

A prequalification course designed to prepare students for study at the 200 level. Passing this course is equivalent to qualification.

**203–204 Composition and Conversation** 203, fall; 204, spring. 3 credits each term. Prerequisite: qualification in Russian. Prerequisite for Russian 204: Russian 203 or equivalent.

Drills, M W R F 11:15 or 2:30. J. Bosky.  
Guided conversation, composition, reading, pronunciation, and grammar review, emphasizing the development of accurate and idiomatic expression in the language.

**Note:** Students placed in the 200-level courses also have the option of taking courses in introductory literature; see separate listings under Russian 200, 201, and 202 for descriptions of these courses, any of which may be taken concurrently with the 203–204 language courses described above. The introductory literature courses are offered by the Department of Russian Literature, and the 203–204 language courses by the Department of Modern Languages and Linguistics.

**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.  
M W F 12:20. J. Bosky.

**305–306 Directed Individual Study** 305, fall; 306, spring. 2 credits. Prerequisites: for Russian 305, Russian 303–304 or equivalent; for Russian 306, Russian 305.

Hours to be arranged. J. Bosky.  
This is a practical language course on an advanced level and is designed to improve oral control of colloquial Russian.

**[401–402 History of the Russian Language]** 401, fall; 402, spring. 4 credits each term. Prerequisites: for Russian 401, qualification in Russian; for Russian 402, Russian 401 or equivalent. Offered alternate years. Not offered 1983–84.

Hours to be arranged. L. H. Babby.  
Phonological, morphological, and syntactic developments from Proto-Slavic to modern Russian.]



**403–404 Linguistic Structure of Russian** 403, fall; 404, spring. 4 credits each term. Prerequisite for Russian 403: qualification in Russian; Linguistics 101–102 recommended. Prerequisite for Russian 404: Russian 403 or equivalent. Offered alternate years.

Hours to be arranged. L. H. Babby.  
A synchronic study and analysis of Russian linguistic structure. Russian 403 deals primarily with phonology and morphology and 404 with syntax.

**[405–406 Advanced Russian Morphology and Syntax** 405, fall; 406, spring. 4 credits each term. Prerequisites: for Russian 405, Russian 304 or permission of instructor; for Russian 406, Russian 405. Not offered 1983–84.

Hours to be arranged. L. H. Babby.  
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, negation, participles, gerunds, and also to building active vocabulary.]

**601 Old Church Slavic** Fall. 4 credits. This course is prerequisite to Russian 602. Offered alternate years.

E. W. Browne.  
Grammar and reading of basic texts.

**602 Old Russian** Spring. 4 credits. Prerequisite: Russian 601. Offered alternate years.

L. H. Babby.  
Structural analysis of Old Russian and close reading of texts.

**651–652 Comparative Slavic Linguistics** 651, fall; 652, spring. 4 credits each term. Prerequisites: for Russian 651, permission of instructor; for Russian 652, Russian 651 or permission of instructor.

Hours to be arranged. E. W. Browne.  
Sounds and forms of the Slavic languages and of prehistoric common Slavic; main historical developments leading to the modern languages.

**700 Seminar in Slavic Linguistics** Offered according to demand. Variable credit.

Staff.  
Topics chosen according to the interests of staff and students.

## Literature

**103 Freshman Seminar: Classics of Russian Thought and Literature** Fall and spring. 3 credits each term.

T R 12:20–1:35. Staff.  
Emphasis is on connections between Russian literary masterpieces and their historical background. The seminar covers both nineteenth- and twentieth-century works. Readings in English translation of Dostoevsky, Solzhenitsyn, and others.

**104 Freshman Seminar: Nineteenth-Century Russian Literary Masterpieces** Fall and spring. 3 credits each term.

Fall: M W F 9:05 or 12:20; spring: M W F 12:20. Staff.  
Readings in English translation of works by Dostoevsky, Tolstoy, and others; limited to nineteenth-century authors. A slightly more literary and less historical course than Russian 103.

**105 Freshman Seminar: Twentieth-Century Russian Literary Masterpieces** Fall and spring. 3 credits each term.

T R 2:30–3:45. Staff.  
Readings in English translation of works by Babel, Pasternak, Solzhenitsyn, and others, studied against the background of Soviet social and political developments.

**[106 Freshman Seminar: Revolution in the Russian Arts** Not offered 1983–84.]

**201–202 Readings in Russian Literature** 201, fall; 202, spring. 3 credits each term. Prerequisite: qualification in Russian. Open to freshmen. Formal requirements: daily homework sheets, occasional quizzes on vocabulary with questions on the texts in Russian and English, a final exam, and one semester paper (10–12 pages) to be written in English on a topic of the student's choice.

M W F 10:10. Staff, fall; C. Emerson, spring.  
Designed as the first literature course taken entirely in Russian—both readings and class discussions. But daily assignments are short and considerable guidance is provided; there is no presumption of fluency. The goals of the course are to introduce students to major genres (lyric poetry, fairy tale, drama, narrative prose); to sample widely-differing literary styles, and to accomplish both without recourse to English in class. Readings from the nineteenth century masters: Pushkin, Gogol, Tolstoy, Dostoevsky, supplemented by twentieth-century poetry. Whenever possible, selected texts are also studied in "transposed" form—first the original, then an illustrated film strip, poetic reading, musical setting, or excerpt from an opera libretto (Mussorgsky's *Boris Godunov*, Rimsky-Korsakov's *Tsar Saltan*, Prokofiev's *War and Peace*).

**[307 Themes from Russian Culture** Not offered 1983–84 ]

**308 Themes from Russian Culture** Spring 4 credits. Requirements: regular attendance and class participation; two in-class midterms; one semester paper, which may be rewritten in place of a take-home final exam. No prerequisites.

M W F 1:25. C. Emerson.  
The major theme is literary realism: how have Russian and Soviet writers, in the last one hundred years, attempted to tell the truth through art? Readings by Tolstoy (nineteenth-century critical realism), Chekhov, Babel, Olesha, Zamyatin, Bulgakov (fantastic realism), Sholokhov and Gladkov (socialist realism), and Solzhenitsyn. Supporting themes include the liberating (and later enslaving) effect of the Revolution, the politicization of Russian literature, and various competing theories of realism as a mode of art. Background lectures on social and political history provided.

**[314 Intellectual Background of Russian Literature, 1825–1930** Not offered 1983–84 ]

**[329 Eastern Europe Today: Economics, Government, Culture (also Government 326 and Economics 329)** Not offered 1983–84 ]

**330 The Soviet Union: Politics, Economics, and Culture (also Economics 330 and Government 330)** Spring. 4 credits.

T R 2:30–3:45. G. Gibian, M. Rush, G. Staller.  
Interdisciplinary survey of the USSR since the Revolution, with emphasis on contemporary developments.

**[331 Russian Poetry** Not offered 1983–84 ]

**[332 Russian Theatre and Drama** Not offered 1983–84.]

**[334 The Russian Short Story** Spring. 4 credits. There may be a section for Russian readers. In English translation. Not offered 1983–84.]

**[335 Gogol** Not offered 1983–84 ]

**[349 Gogol's Posterity: Satire under the Soviets** Not offered 1983–84 ]

**[350 Tolstoy and the Disciplines (also College Scholar 350)** Not offered 1983–84 ]

**367 The Russian Novel** Spring. 4 credits. Also open to graduate students. There will be a special discussion section for students who read Russian; if they are Russian majors, they may count the course as one in the original language.

T R 9:05 plus one hour to be arranged. G. Gibian.  
Study of the major Russian prose writers of the nineteenth and twentieth centuries. Novels and short stories by Gogol, Turgenev, Tolstoy, Dostoevsky, Chekhov, Solzhenitsyn, and others.

**368 Soviet Literature** Fall. 4 credits. Also open to graduate students. There will be a special section for those able to read Russian.

M W F 12:20. G. Gibian.  
Selected works of Russian literature, 1917 to date, examined primarily as works of art, with some attention to their social, political, and historical importance. Mayakovsky, Babel, Pasternak, Solzhenitsyn, and others. In English translation.

**[369 Dostoevsky** Not offered 1983–84 ]

**373 Chekhov (in English Translation)** Fall. 4 credits. A special section is offered for students who read Russian; this section may be used toward the 12 credits of Russian literature in the original language for the Russian major.

T R 2:30–3:45. S. Senderovich.  
Reading and discussion of Chekhov's works, with main emphasis on the short story. The course is designed for nonspecialists as well as literature majors. A variety of approaches will be employed; informal lectures and discussions.

**[379 The Russian Connection (also Comparative Literature 379)** Not offered 1983–84.]

**388 Politics and the Novel (also Comparative Literature 388)** Fall. 4 credits.

M W F 9:05. G. Gibian.  
From the French Revolution to the present. Literary representations of conflicts between political ideologies (ideas of revolution, justice, nationalism) and private needs (art, nature, love, order). Marx, Stendhal, Dostoevsky, Conrad, Henry James, Trotsky, Lenin, V. S. Naipaul, Solzhenitsyn, Kundera. Some poetry will also be included: Yeats, Mayakovsky, Auden. Lectures and discussions.

**[389 Modern Literature in Poland, Czechoslovakia, and Yugoslavia (also Comparative Literature 389)** Not offered 1983–84.]

**393 Honors Essay Tutorial** Fall or spring. 4 credits.  
Hours to be arranged. Staff.

**[415 Fairytale and Narrative (also Comparative Literature 415)** Not offered 1983–84 ]

**[431 Short Russian Prose** Not offered 1983–84 ]

**[432 Pushkin** Not offered 1983–84.]

**491 Reading Course: Russian Literature in the Original Language** Fall or spring. 1 credit each term. Prerequisite: permission of instructor.

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.

**492 Supervised Reading in Russian Literature** Fall or spring. 1–4 credits each term.

Hours to be arranged. Staff.  
Topic for fall: Translating modern Russian poetry. 1 credit. P. Schmidt. An analysis of four Russian modernist poets, Khlebnikov, Mayakovsky, Tsvetaeva, and Akhmatova, using the process of translation as a tool of critical analysis. The class will meet for six seminar sessions, each two hours long, over a period of two weeks. Each student will work on a translation project as part of the course work and Mr. Schmidt will be available to individual students for consultation.

**[493 Tolstoy's *War and Peace* and Children's Stories: Thematic Invariance and Plot Structure]** Not offered 1983–84 ]

**[494 Early Literary Semiotics, East and West]** Not offered 1983–84 ]

**[498 The Age of Symbolism]** Not offered 1983–84 ]

**[499 Russian Modernism]** Not offered 1983–84 ]

#### Graduate Seminars

**611 Supervised Reading and Research** Fall or spring. 2–4 credits. Prerequisite: permission of the department.  
Hours to be arranged. Staff.

**[617 Russian Stylistics I]** Not offered 1983–84.]

**618 Russian Stylistics II** Spring. 4 credits. Open to advanced undergraduates. Conducted in Russian.  
R 4–6. S. Senderovich.  
Introduction to the diversity of styles of modern Russian and training in stylistically coherent writing.

**[620 Studies in Modern Poetry]** Not offered 1983–84 ]

**[621 Russian Literature from the Beginnings to 1700]** Not offered 1983–84 ]

**[622 Eighteenth-Century Literature]** Not offered 1983–84.]

**[623 Early Nineteenth-Century Literature]** Not offered 1983–84.]

**624 Russian Romanticism** Spring. 4 credits. Taught in Russian.  
T 4–6. I. Serman.  
A survey of concepts, themes, genres, and main individual contributors in Russian literature of the age of romanticism.

**[625 Russian Realism]** Not offered 1983–84 ]

**671 Seminar in Nineteenth-Century Russian Literature** Fall. 4 credits. Open to advanced undergraduates.  
W 3:35–5:35. P. Carden.  
Topic: Tolstoy's *Voyna i mir*. An intensive study of the text of Tolstoy's novel using his drafts and other materials.

**[672 Pasternak]** Spring. 4 credits. Not offered 1983–84.  
R 4–6. A. Zholkovsky.]

**[701 Proseminar: Methods in Research and Criticism]** Not offered 1983–84.]

#### Courses in English

**103 Freshman Seminar: Classics of Russian Thought and Literature**

**104 Freshman Seminar: Nineteenth-Century Russian Literary Masterpieces**

**105 Freshman Seminar: Twentieth-Century Russian Literary Masterpieces**

**308 Themes from Russian Culture**

**330 The Soviet Union: Politics, Economics, and Culture (also Economics and Government 330)**

**334 The Russian Short Story**

**367 The Russian Novel**

**368 Soviet Literature**

**373 Chekhov**

**388 Politics and the Novel (also Comparative Literature 388)**

#### Courses in Russian

**201–202 Readings in Russian Literature**

**491 Reading Course: Russian Literature in the Original Language**

**492 Supervised Reading in Russian Literature**

**611 Supervised Reading and Research**

**618 Russian Stylistics II**

**624 Russian Romanticism**

**671 Seminar in Nineteenth-Century Russian Literature**

#### Sanskrit

See Linguistics 641–642.

#### Serbo-Croatian

**131–132 Elementary Course** 131, fall; 132, spring. 3 credits each term. Prerequisite for Serbo-Croatian 132: Serbo-Croatian 131 or equivalent.  
Hours to be arranged. E. W. Browne.

**[133–134 Intermediate Course II]** 133, fall; 134, spring. 3 credits each term. Prerequisites: for Serbo-Croatian 133: Serbo-Croatian 132 or equivalent; for Serbo-Croatian 133 or equivalent. Not offered 1983–84.  
E. W. Browne.]

#### Sinhala (Sinhalese)

**101–102 Elementary Course** 101, fall; 102, spring. 6 credits each term. Prerequisite for Sinhala 102: Sinhala 101 or equivalent.

Hours to be arranged. 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.

**201–202 Sinhala Reading** 201, fall; 202, spring. 3 credits each term. Prerequisites: for Sinhala 201, qualification in Sinhala; for Sinhala 202, Sinhala 201 or equivalent.  
Hours to be arranged. J. W. Gair and staff.

**203–204 Composition and Conversation** 203, fall; 204, spring. 3 credits each term. Prerequisites: for Sinhala 203, Sinhala 202 or permission of instructor; for Sinhala 204, Sinhala 203 or equivalent.  
Hours to be arranged. J. W. Gair and staff.

#### Related Courses

See also Linguistics 341, 442, 631, 640, 641.

#### Spanish

U. J. DeWinter, J. W. Kronik, C. Moron-Arroyo, C. Piera, M. Randel (director of undergraduate studies [literature], 291 Goldwin Smith Hall, 256-4766), E. M. Santí, M. Suñer (director of undergraduate studies [language], 218 Morrill Hall, 256-3384), J. Tittler, K. Vernon

#### 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 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 Randel (291 Goldwin Smith Hall), who will admit them to the major, and choose an adviser from the Spanish faculty of either the Department of Romance Studies or the Department of Modern Languages and Linguistics. 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) two literature courses of the 315–316–317 series.
- 2) 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 24 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) Spanish linguistics, for which the program normally includes 401, 407, 408, and at least 12 additional credits in general or Spanish linguistics. (Linguistics 101–102 are recommended before entering this program.) Students interested in including linguistics in their programs should consult with the coordinator of Spanish for the Department of Modern Languages and Linguistics (Professor M. Suñer).
- 3) A combination of literature and linguistics.
- 4) Any of the above options with certain courses in other disciplines counted towards 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.

Spanish majors are encouraged to spend all or part of the junior year in a Spanish-speaking country on one of the study-abroad programs organized by American universities that allow the transfer of grades and credits. The J. G. White Prize and Scholarships are available annually to students who achieve excellence in Spanish.

**Honors.** Honors in Spanish may be achieved by superior students who wish 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 copies of texts for course work.

## Language and Linguistics

**121–122 Elementary Course** 121, fall; 122, spring. 4 credits each term. Prerequisite for Spanish 122: Spanish 121. Special sections of this course are available for students with qualification in another language. Intended for beginners or students placed by examination. Students who obtain a CPT achievement score of 560 after Spanish 121–122 attain qualification and may enter the 200-level sequence; otherwise Spanish 123 is required for qualification.

Lec, R 12:20 or 2:30, or F 11:15 or 1:25; drills, M–R 8, 9:05, 10:10, 11:15, 12:20, 1:25, 2:30, or 3:35. Evening prelims: fall, 7:30 p.m., Oct. 27; spring, 7:30 p.m., March 20. Staff.

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.

**123 Continuing Spanish** Fall or spring. 4 credits. Limited to students who have previously studied Spanish and have a CPT achievement score between 450 and 559. Satisfactory completion of Spanish 123 fulfills the qualification portion of the language requirement.

Fall: lec, M 10:10 or 1:25; drills, T–F 8, 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. Spring: lec, M 11:15 or 1:25; drills, T–F 9:05, 10:10, 11:15, or 12:20. Evening prelims: fall, 7:30 p.m., Oct. 4, Nov. 8; spring, 7:30 p.m., February 28, April 10. Staff.  
An all-skills course designed to prepare students for study at the 200-level.

**203 Intermediate Composition and Conversation** Fall or spring. 3 credits. Prerequisite: qualification in Spanish.

Fall: M W F 8, 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. Spring: M W F 8, 9:05, 10:10, 12:20, 1:25, or 2:30. Evening prelims: fall, 7:30 p.m., Oct. 13; spring, 7:30 p.m., March 6. Staff.  
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.

**204 Intermediate Composition and Conversation** Fall or spring. 3 credits. Prerequisite: Spanish 203 or permission of instructor.

Fall: M W F 12:20 or 1:25. Spring: M W F 9:05, 10:10, 11:15, 12:20, or 1:25. Staff.  
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.

**211 Intermediate Spanish** Fall. 3 credits. Prerequisite: qualification in Spanish. Offered by the Department of Romance Studies. Taught in Spanish.  
M W F 9:05 or 11:15. J. Tittler.  
Refinement of written and oral skills is attained through a grammar review, written exercises, practice in conversation, assorted readings, and short essays.

**212 Intermediate Spanish** Spring. 3 credits. Prerequisite: Spanish 211 or 203, or placement by Advanced Standing Exam. Offered by the Department of Romance Studies. Taught in Spanish.  
M W F 9:05 or 10:10. J. Tittler.  
Continued emphasis on improving written and oral comprehension and expression.

**310 Advanced Conversation and Pronunciation** Spring. 2 credits. Prerequisite: Spanish 204 or equivalent.  
M W F 9:05. Staff.

**311 Advanced Composition and Conversation (formerly 303)** Fall. 4 credits. Prerequisite: Spanish 204 or equivalent.

M W F 11:15 or 12:20. M. Randel.  
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.

**312 Advanced Composition and Conversation** Spring. 4 credits. Continuation of Spanish 311 but may be taken separately. Required of Spanish majors.

M W F 11:15 or 12:20. M. Randel.  
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.

**401–402 History of the Spanish Language** 401, fall; 402, spring. 4 credits each term. Prerequisites: Linguistics 101 and qualification in Spanish, or permission of the instructor.

T R 12:20–1:25. C. Piera.  
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.

**407 Applied Linguistics: Spanish** Fall. 4 credits. Prerequisites: qualification in Spanish and Linguistics 101, or permission of instructor.

M W F 11:15. M. Suñer.  
Designed to equip the teacher of Spanish with the ability to apply current linguistic theory to second-language learning.

**408 The Grammatical Structure of Spanish** Spring. 4 credits. Prerequisites: qualification in Spanish and Linguistics 101 or permission of instructor.

Hours to be arranged. Staff.  
Survey of the salient morphological and syntactic characteristics of contemporary Spanish.

**[601 Hispanic Dialectology** Fall, according to demand. 4 credits. Survey of dialects to Latin America and the Caribbean.]

**602 Linguistic Structure of Ibero-Romance** Fall or spring, according to demand. 4 credits.

Hours to be arranged. C. Piera.  
Phonological, morphological, and syntactic characteristics of the Romance languages (Catalan, Galician, Portuguese, Sephardic) and of the main dialects of the Iberian Peninsula, studied in relation to each other and to Castilian Spanish.

**603 Contemporary Theories of Spanish Phonology** Fall or spring, according to demand. 4 credits.

Hours to be arranged. Staff.  
The sounds of Spanish analyzed according to Prague, structuralist, generative, and natural generative theory.

**604 Contemporary Theories of Spanish Grammar** Fall or spring, according to demand. 4 credits.

Hours to be arranged. M. Suñer.  
Selected readings of contemporary Spanish linguistics who exemplify different theoretical points of view.

**700 Seminar in Spanish Linguistics** Fall or spring, according to demand. Variable credit.  
Hours to be arranged. Staff.  
Topics in synchronic and diachronic Spanish linguistics.

## Literature

**201 Introduction to Hispanic Literature** Fall or spring. 3 credits. Prerequisite: qualification in Spanish or permission of instructor. Conducted mainly in Spanish. (The literature course that normally follows Spanish 201 is 315, 316, or 317).

Fall: M W F 9:05, 10:10, or T R 12:20–1:35. Spring: M W F 9:05, 10:10, or 12:20–1:35. J. Tittler and staff.

An intermediate reading course in which texts from Spain and Spanish America are read and analyzed. The course is designed to increase reading and speaking facility in Spanish and to develop critical and analytical skills in the appreciation of literary texts.

**313 Spanish Civilization: Spain after Franco** Fall. 4 credits. Taught in Spanish.

T R 8:40–9:55. C. M. Arroyo.  
A study of the present situation of Spain and its historical background since the Civil War (1936–39). The socialist government, its problems and accomplishments in politics, economics, and culture. The transition from the Franco period and the role of King Juan Carlos since 1975. Historical background of the transition: liberal thought, and economic and educational expansion during the Franco regime. The Franco dictatorship and its theorists: concepts of fascism, Falange, and socialism. References to architecture, music, and other aspects of culture are systematically included.

Note: Spanish 315, 316 and 317 can be taken in any order.

**[315 Readings in Sixteenth- and Seventeenth-Century Hispanic Literature** Not offered 1983–84. M. Randel.]

**316 Readings in Modern Spanish Literature** Fall. 4 credits. Prerequisite: Spanish 201 or 4 years of high school Spanish or permission of instructor.

T R 10:10–11:25 or 12:20–1:35. K. Vernon.  
Readings and discussion of representative texts from Spain from the Romantic period to the present. Becquer, Galdos, Unamuno, Garcia Lorca, and others.

**317 Readings in Spanish-American Literature** Spring. 4 credits.

M W F 11:15, M. López-Baralt; T R 10:10, K. Vernon.  
Reading and discussion of representative texts of the nineteenth and twentieth centuries from Spanish America: Dario, Neruda, Borges, Paz, Garcia Marquez, Cortazar, and others.

**[323 Readings in Latin American Civilization** Fall. 4 credits. Not offered 1983–84.

E. Santí.]  
Note: The prerequisite for the following courses, unless otherwise indicated, is Spanish 315 or 316 or 317 or permission of instructor.

**[331 The Modern Drama in Spanish America** Not offered 1983–84.]

**[332 Modern Drama in Spanish America** Not offered 1983–84.]

**[333 The Spanish-American Short Story** Not offered 1983–84.]

**[335 The New Latin-American Narrative in Translation (also Comparative Literature 335 and General Education)** Not offered 1983–84.]

**[336 Popular Culture in Contemporary Spanish-American Prose Fiction** Not offered 1983–84.]

**345 The Contemporary Spanish-American Novel** Fall. 4 credits. Taught in Spanish.  
M W F 1:25. J. Tittler.

Reading and discussion of selected works of narrative fiction by today's leading authors: Cabrera Infante, Cortázar, Donoso, Fuentes, García Márquez, Vargas Llosa, and others.

**346 Hispanic Caribbean Culture and Literature** Spring. 4 credits. Taught in Spanish.  
M W F 1:25. M. Lopez-Baralt.

An introduction to the history, culture, and literature of the Hispanic Caribbean, with major emphasis on Cuba, Santo Domingo, and Puerto Rico. Analysis of the cultural and social peculiarities of the Caribbean area and its expression in art. Plantation and slave societies; the African influence in literature and popular music; emigration; and revolution are among the topics we will explore in the works of Martí, Hostos, Ortiz, Guillén, Palés Matos, Carpentier, Bosch, Arenas, Sánchez, and others.

**[351 Spanish Drama of the Golden Age]** Not offered 1983–84.]

**355 Cervantes: *Don Quixote*** Fall. 4 credits. Taught in Spanish.

M W F 10:10. M. Randel.  
Close reading of Cervantes's masterpiece. Discussions will consider the text as a mirror of its historical moment, of its self-conscious author, of its readers' search for meaning.

**[356 Spanish Lyric Poetry of the Golden Age]** Spring. 4 credits. Not offered 1983–84.  
M. Randel.]

**[368 The Birth of the Novel in Spain: Toward Don Quixote]** Not offered 1983–84.]

**375 The Picaresque Novel in a European Perspective** Spring. 4 credits. Taught in Spanish.  
M W F 10:10. M. Randel.

A study of picaresque novels from the sixteenth to twentieth centuries. Discussions will focus on fictional representations of the antiheroic rogue and the seamy side of life as evidence of social consciousness and as an ongoing series of experiments in the writing of prose fiction. Spanish texts of *Lazarillo de Tormes*, Alemán, Cervantes, Quevedo, Cela and others will be supplemented by readings in other European Picaresque (in translation as necessary).

**[376 The Contemporary Spanish Novel]** Spring 4 credits. Not offered 1983–84.  
K. Vernon.]

**[386 The Nineteenth-Century Spanish Novel]** Not offered 1983–84.]

**389 The Generation of 1898** Fall. 4 credits.

T R 12:20–1:35. U. J. DeWinter.  
In 1898 a generation of writers brought about a major transformation of the artistic, intellectual, and historical climate of Spain. We will discuss novels, essays, poems, and plays by Unamuno, Valle-Inclán, Baroja, Azorín, Machado, Benavente (Nobel Prize in 1922), Juan Ramón Jiménez (Nobel Prize in 1956), and Pérez de Ayala. This cosmopolitan group of writers broke with the conventional literary genres of the nineteenth century: they introduced a new intimate and Existentialist novel; they created a new poetic language; and they integrated the main artistic and philosophical movements of Europe and America, including symbolism, modernism, irrationalism, and vitalism.

**[390 Sociology and Literature in Twentieth-Century Spain]** Not offered 1983–84.]

**[391 The Post-Civil War Drama in Spain]** Not offered 1983–84.]

**[392 Valle-Inclán and the Twentieth-Century Vanguard Theater in Spain]** Spring. 4 credits. Not offered 1983–84.  
J. Kronik.]

**[393 The Reader in the Novel (also Comparative Literature 369)]** Fall. 4 credits. Not offered 1983–84.  
K. Vernon.]

**[394 Art and Politics in Latin America]** Not offered 1983–84.]

**[395 The Novel in Spain after the Civil War]** Fall. 4 credits. Not offered 1983–84.  
J. Kronik.]

**[396 Modern Latin American Poetry in Translation (also Comparative Literature 396)]** Not offered 1983–84.]

**[398 Modern Hispanic Poetry]** Not offered 1983–84.]

**399 Spanish Film** Spring. 4 credits.  
T R 2:30–3:45. Students should also reserve W afternoons and evenings for some film viewing.  
K. Vernon.

A course devoted to the appreciation and analysis of recent Spanish cinema. Beginning with the works of its best-known directors, Bunuel and Saura, we will focus on Spanish film as a narrative response to Spanish reality, both artistic (in the filmic translation of other media, such as novel and ballet) and historical (in particular, the Spanish Civil War and its consequences).

**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.

**429–430 Honors Work in Hispanic Literature** 429, fall; 430, spring. 4 credits each term. Limited to seniors. Prerequisite: permission of instructor.  
Staff.

**[439 Medieval Literature]** Not offered 1983–84.]

**440 Medieval Spanish Literature to 1400** Spring. 4 credits. Open to majors. Taught in Spanish.  
T R 2:30–3:45. C. M. Arroyo.

A study of the major works of medieval Spanish literature in light of contemporary scholarship and methodologies. Readings include *Mío Cid*, *Libro de Buen Amor*, *Conde Lucanor*. Excerpts from Alfonso X's *Chronicle*, and an anthology of medieval lyrics.

**[441 Medieval Literature 1300–1508]** Not offered 1983–84.]

**[446 The Early Spanish Love Lyric: Origins to 1700]** Spring. 4 credits. Not offered 1983–84.  
J. Tittler.]

**[456 Figurative Landscapes in Spanish-American Fiction]** Not offered 1983–84.]

**[457 Readings from Don Quixote's Library (also Comparative Literature 358)]** Not offered 1983–84.]

**[459 Being, God, Mind: Key Terms of Western Thought from Plato to Vico (also Romance Studies 459 and Comparative Literature 359)]** Fall. Not offered 1983–84.  
C. M. Arroyo.]

**[461 The Rhetoric of Honor]** Not offered 1983–84.]

**[466 Cervantes: *Don Quixote*]** Not offered 1983–84.]

**[479 Colonial Spanish-American Literature]** Not offered 1983–84.]

**[481 Eighteenth- and Nineteenth-Century Spanish Drama]** Not offered 1983–84.]

**[486 Realism and Naturalism in Spain: Clarín, Pardo Bazán, Blasco Ibañez]** Spring. 4 credits. Not offered 1983–84.  
J. Kronik.]

**[489 Hispanic Romanticism]** Fall. 4 credits. Not offered 1983–84.  
E. Santí.]

**497 Spanish Poetry and Poetics** Fall. 4 credits. Taught in Spanish.

W 2:30–4:25. K. Vernon.  
This course will focus on the development of modern Spanish poetry from Becquer to the present. Readings will include texts by Becquer, Machado, Lorca, Jiménez, Guillén, and others as well as poetic and theoretical works designed to help us situate Spanish poetry with respect to such contemporary European esthetics as romanticism, symbolism, and postsymbolism.

**639–640 Special Topics in Hispanic Literature** 639, fall; 640, spring. 4 credits each term. To be taken by all new graduate students.  
Staff.

**[647 Studies in the Literature of Fifteenth-Century Spain]** Fall. 4 credits. Not offered 1983–84.  
C. M. Arroyo.]

**[689 Carlos Fuentes]** Spring. Not offered 1983–84.]

**[690 Graduate Seminar: Baroque and Neobaroque]** Spring. Not offered 1983–84.  
E. Santí.]

**693 Ortega y Gasset** Fall. 4 credits. Taught in Spanish.

T 2:30–4:25. C. M. Arroyo.  
A reading of Ortega's writings on metaphor (1914), the novel (1914–1925), and *The Dehumanization of Art* (1925) in comparison with some poems and novels, and with Lukács's *Theory of the Novel* and Heidegger's *The Origin of the Work of Art*.

**695 Graduate seminar: Gabriel García Márquez** Spring. 4 credits. Taught in Spanish.

W 2:30–4:25. J. Tittler.  
A detailed study of García Márquez's *Cien años de soledad* and *El otoño del patriarca* and of the criticism to which these acclaimed novels have given rise. An attempt will be made to assess the Nobel laureate's place in Colombian, Spanish-American, and Western literature.

**[696 The Contemporary Spanish-American Novel]** Not offered 1983–84.]

**[699 Ortega y Gasset's *The Dehumanization of Art and Ideas of the Novel* (1925) (also Comparative Literature 690)]** Not offered 1983–84.]

#### Related Course in Another Department

**The European Novel (Comparative Literature 363–364)**

#### Swahili

See Africana Studies and Research Center.

#### Tagalog

**[101–102 Elementary Course]** 101, fall; 102, spring. 6 credits each term. Offered according to demand. Prerequisite: permission of instructor. Prerequisite for Tagalog 102: Tagalog 101. Not offered 1983–84.

Hours to be arranged. J. U. Wolff.]

**201–202 Tagalog Reading** 201, fall; 202, spring. 3 credits each term. Prerequisites: for Tagalog 201, Tagalog 102 or equivalent; for Tagalog 202, Tagalog 201 or equivalent.

Hours to be arranged. J. U. Wolff.

**[300 Linguistic Structure of Tagalog]** Fall or spring. 4 credits. Prerequisite: Linguistics 101. Not offered 1983–84.

Hours to be arranged. J. U. Wolff.]

## Tamil

**101–102 Elementary Course** 101, fall; 102, spring. 6 credits each term. Offered according to demand. Prerequisite for Tamil 102: Tamil 101 or equivalent.

Hours to be arranged. J. W. Gair.

## Telugu

**101–102 Elementary Course** 101, fall; 102, spring. 6 credits each term. Prerequisite for Telugu 102: Telugu 101 or equivalent.

Hours to be arranged. G. Kelley.

**[201–202 Telugu Reading]** 201, fall; 202, spring. 3 credits each term. Prerequisites: for Telugu 201: qualification in Telugu; for Telugu 202, Telugu 201 or equivalent. Not offered 1983–84.

G. Kelley.]

See also Linguistics 341, 440.

## Thai

**101–102 Elementary Course** 101, fall; 102, spring. 6 credits each term. Prerequisite for Thai 102: Thai 101 or equivalent. Intended for beginners or students placed by examination.

Lecs, T R 11:15; drills, M–F 10:10. R. B. Jones. A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

**201–202 Thai Reading** 201, fall; 202, spring. 3 credits each term. Prerequisites: for Thai 201, qualification in Thai; for Thai 202, Thai 201 or equivalent.

M W F 2:30. R. B. Jones.

**203–204 Composition and Conversation** 203, fall; 204, spring. 3 credits each term. Prerequisites: for Thai 203, qualification in Thai; for Thai 204, Thai 203.

Hours to be arranged. R. B. Jones.

**301–302 Advanced Thai** 301, fall; 302, spring. 4 credits each term. Prerequisite: Thai 201–202 or equivalent.

M W F 12:20. R. B. Jones.

Selected readings in Thai writings in various fields.

**303–304 Thai Literature** 303, fall; 304, spring. 4 credits each term. Prerequisite: Thai 301–302 or equivalent.

Hours to be arranged. R. B. Jones.

Reading of significant novels, short stories, and poetry written since 1850.

**401–402 Directed Individual Study** 401, fall; 402, spring. 4 credits each term. For advanced students. Prerequisite: permission of instructor.

Hours to be arranged. R. B. Jones.

## Turkish

**[131–132 Introduction to the Turkish Language]** 131, fall; 132, spring. 3 credits each term. Not offered 1983–84.

Hours to be arranged. L. Babby.

This year-long introduction to structure of the Turkish language is intended primarily for linguists wishing to acquire a working knowledge of a syntactically

complex non-Indo-European language. It can also be taken by students primarily interested in learning Turkish.]

## Ukrainian

**[131–132 Elementary Course]** 131, fall; 132, spring. 3 credits each term. Prerequisite for Ukrainian 132: Ukrainian 131 or equivalent. Not offered 1983–84.

E. W. Browne.]

## Vietnamese

**101–102 Elementary Course** 101, fall; 102, spring. 6 credits each term. Prerequisite for Vietnamese 102: Vietnamese 101 or equivalent. Intended for beginners or students placed by examination.

M–F 8; lec to be arranged. F. E. Huffman.

**201–202 Vietnamese Reading** 201, fall; 202, spring. 3 credits each term. Prerequisites: for Vietnamese 201, qualification in Vietnamese; for Vietnamese 202, Vietnamese 201.

Hours to be arranged. F. E. Huffman.

**203–204 Composition and Conversation** 203, fall; 204, spring. 3 credits each term. Prerequisites: for Vietnamese 203: qualification in Vietnamese; for Vietnamese 204, Vietnamese 203.

Hours to be arranged. F. E. Huffman.

**301–302 Advanced Vietnamese** 301, fall; 302, spring. 4 credits each term. Prerequisite: Vietnamese 201–202 or equivalent.

Hours to be arranged. F. E. Huffman.

**401–402 Directed Individual Study** 401, fall; 402, spring. 4 credits each term. Prerequisite: permission of instructor. Intended for advanced students.

Hours to be arranged. F. E. Huffman.

## Yiddish

See Near Eastern Studies, p. 173, for course listings.

## Music

J. Webster, chairman; D. R. M. Paterson, director of undergraduate studies (213 Lincoln Hall, 256-3531); W. W. Austin, M. Bilson, L. Coral, M. Hatch, J. Hsu, K. Husa, S. Monosoff, E. Murray, R. Parker, D. M. Randel, T. A. Sokol, M. W. Stith, S. Stucky, B. Troxell, N. Zaslav

### 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, which 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:

Cornell Symphony Orchestra  
Cornell Chamber Orchestra  
Cornell Symphonic Band  
Cornell Wind Ensemble  
Small wind and brass ensembles  
Collegium Musicum  
Cornell Eighteenth-Century Orchestra  
Cornell Gamelan Ensemble  
Chamber music ensembles  
Cornell Chorus  
Cornell Glee Club  
Chamber Singers  
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 nearly 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 these concerts are free and open to the public. These 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 prerequisite and presuppose no previous formal training in music. Consult the following course listings, and for further information apply to the department office, 125 Lincoln Hall (256-4097), or to the director of undergraduate studies, Professor D. R. M. Paterson, 213 Lincoln Hall (256-3531).

### 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 wish to prepare for eventual 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 *during the orientation period of the freshman year, or earlier if at all possible*. Information is available from the director of undergraduate studies, Professor D. R. M. Paterson, 213 Lincoln Hall (256-3531), or from the chairman, Professor James Webster, 124 Lincoln Hall (256-3671). 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 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:
  - a) Music 251–252, 351, and 352.
  - b) passing of a simple literacy test in music, normally by the end of the junior year (details are available in the department office);
- 2) in music history:
  - sixteen credits in courses numbered at the 300 level or above listed under Music History. At least two of these courses must be drawn from the three-course sequence Music 381–383;
- 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 the 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 faculty members to guide and evaluate the honors work. In the senior year the candidate will enroll in Music 401–402, with the chairperson of the honors committee as instructor. Candidates will be encouraged to formulate programs that will allow them to demonstrate their total musical ability. The level of honors conferred will be based on the whole range of the independent work in this program, of which a major part will culminate in an honors thesis, composition, or recital to be presented not later than April 1 of the senior year, and a comprehensive examination to be held not later than May 1.

## Distribution Requirement

The distribution requirement in the expressive arts may be satisfied with 6 credits in music, except Freshman Seminars and Music 122. 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 the standard research tools. Its holdings consist of approximately ninety thousand books and scores and fifteen thousand records. Particularly noteworthy are the collections of opera scores, librettos, and recordings from all periods; twentieth-century scores and recordings; and the large microfilm collection of Renaissance sources, both theoretical and musical. In addition, the Department of Rare Books, in Olin Library, houses a collection of early printed books on music and musical manuscripts.

**Musical Instruments.** The Verne S. Swan collection of about thirty musical instruments is especially rich in old stringed instruments. A small Chellis harpsichord and clavichord are available for practice; a Dowd harpsichord, a Hubbard harpsichord, and replicas of a Stein fortepiano and a Graf fortepiano are reserved for advanced students and concerts. Among the recital pianos available for use are Steinway and Mason & Hamlin concert grands and a Boesendorfer Imperial. There is an Aeolian-Skinner organ in Sage Chapel, a Schlicker organ at Barnes Hall, and a Helmuth Wolff organ in Anabel Taylor Chapel. A studio for electronic music is housed in Lincoln Hall.

## Freshman Seminars

**111 Sound, Sense, and Ideas** Fall or spring. 3 credits. Each section limited to 18 students. No prerequisites; students do not need to have studied music. May not be counted for the distribution requirement in the expressive arts.  
Sec 1, M W F 10:10, W. Schneider; sec 2, M W F 11:15, C. Clark.  
Ways of listening, thinking, talking, and writing about music. Non-Western and popular music are considered, as well as Western classical music. Student performances in class are welcome.

**[113 Opera]** Fall. 3 credits. Limited to 18 students. No prerequisites; students do not need to have studied music. May not be counted for the distribution requirement in the expressive arts. Not offered 1983–84.]

**[114 Contemporary Music]** Spring. 3 credits. Limited to 18 students. No prerequisites; student do not need to have studied music. May not be counted for the distribution requirement in the expressive arts. Not offered 1983–84.]

**116 Music and the American Media** Spring. 3 credits. Limited to 18 students. No prerequisites; students do not need to have studied music. May not be counted for the distribution requirement in the expressive arts.  
M W F 12:20, P. Will.

## Introductory Courses

**101 The Art of Music** Fall. 3 credits.  
T R 11:15; 1-hour disc to be arranged.  
W. W. Austin.  
Explorations, chiefly through study of phonograph records, designed to speed up the continuing development of various independent tastes. Each student chooses individually what to study from among diverse styles of music; instructors help refine these choices through the term; everyone studies a few assigned works, especially by J. S. Bach, Ludwig van Beethoven, and Béla Bartók, to provide a common focus for tracing and discussing historical continuities and changes. Diversity is represented in the lectures by live performances as well as recordings. The lectures are organized to survey melody, rhythms, chords, and musical forms, suggesting ways to study any music—beyond the course as well as within it.

**103 Introduction to the Musics of the World** Spring. 3 credits.  
T R 9:05; 1 hour lab to be arranged. M. Hatch.  
The ingredients of music as they present themselves in folk, popular, and art musics, both in the West and in other cultural areas, especially Africa and Southeast Asia. Topics include pitch, scale, rhythm, meter, timbre, and forms of instrumental and vocal play with sound. Listening to and analyzing live and recorded musics.

**105–106 Introduction to Music Theory** 105, fall; 106, spring. 5 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.

M W 9:05; 2 disc hours to be arranged. 105: D. Randel; 106: R. Parker.  
An elementary, self-contained introduction to music theory, emphasizing fundamental musical techniques, theoretical concepts, and their application. Music 105: ear training; 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. 106: systematic introduction to counterpoint; original composition of four-part chorales or short keyboard pieces.

**108 Bach to Debussy** Spring. 3 credits.  
Prerequisite: Music 105 or permission of instructor.  
M W 9:05, D. Randel.

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.

**122 Elementary Musicianship** Spring. 2 credits. Limited to 20 students. May not be counted for distribution in the expressive arts.

Sec 1, M W 3:35; sec 2, T R 3:35. D. Campfield.  
Designed primarily to prepare freshmen and others who wish to enroll in Music 151 to meet its prerequisite in practical musicianship. Intensive drill in matching pitches, singing melodies at sight, melodic dictation, harmonic progressions at the keyboard, and reading treble and bass clefs together. A final grade of B– in Music 122, with failure in no individual component, satisfies the prerequisite for Music 151.

## Music Theory

**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); or Music 122 with a grade of B– or better and failure in no individual component. 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 9:05; 2 disc hours to be arranged. E. Murray and staff.  
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.

**245–246 Theory and Practice of Gamelan** 245, fall; 246, spring. 2 credits each term. Prerequisite: concurrent enrollment in Music 445 or 446, and permission of instructor. Music 245 is not a prerequisite to 246.

M W F 12:20 (any two of these three hours) plus 1 disc hour to be arranged. M. Hatch.  
Readings, listening, and concentrated instruction in the literature, recordings, repertoires, and practices of Indonesian gamelan traditions. Related aspects of culture—drama, dance, literature, and oral poetry—will be studied in their influence on musical practice. Research into performance styles and the history of instruments.

**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 disc hours to be arranged. 251, J. Feigin; 252, D. R. M. Paterson.  
Introduction to writing two- and three-part counterpoint in the style of J. S. Bach. 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.

**351 Advanced Tonal Theory** Fall. 4 credits.  
Prerequisite: Music 252 or equivalent.  
M W F 9:05. Staff.

Inventions, chromatic harmony, analysis of larger forms and nineteenth-century music, ear training, score reading, and advanced keyboard studies, including figured bass.

**352 Materials of Twentieth-Century Music** Spring. 4 credits. Prerequisite: Music 351.  
M W F 9:05. W. Austin.

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.

**[451 Counterpoint]** Spring. 4 credits. Prerequisite: Music 351 or equivalent. Not offered 1983–84.]

**[452 Form and Analysis]** Spring. 4 credits.  
Prerequisite: Music 351 or equivalent. Not offered 1983–84.  
M W F 10:10. D. R. M. Paterson.]

**456 Orchestration** Fall. 4 credits. Prerequisite: Music 252 or permission of instructor.  
T 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.

**[460 Electronic Music Composition]** Spring. 3 credits. Limited to 10 students. Prerequisites: Music 251 and permission of instructor. Not offered 1983–84.  
M 1:25–4:25. M. Stith and staff.]

**[462 Orchestral Conducting]** Fall. 2 credits.  
Prerequisite: Music 352. Not offered 1983–84.  
T 10:10–12:05. K. Husa.]

**[463 Choral Conducting]** Spring. 2 credits.  
Prerequisite: Music 252 or permission of instructor. Not offered 1983–84.  
F 2:30–4:10. T. A. Sokol.]

**[464 Choral Style]** Spring. 2 credits. Prerequisite: Music 252 or permission of instructor. Not offered 1983–84.  
F 2:30–4:10. T. A. Sokol.]

## Music History

**218 Chopin, Chalkovski, Musorgskii** Spring. 3 credits. Students may wish to register concurrently in Music 219.  
T R 11:15; disc to be arranged. W. W. Austin, G. Gibian, and staff.

Chief works of the three composers, including symphonies, concertos, and operas, are studied through phonograph records. Piano music and chamber music are presented in live performance.

The biographical, social, and intellectual contexts of the music are considered in relation to concerns of the present. Students' essays may deal with such concerns more than any technical aspect of the music, though techniques are not neglected.

**219 Chopin, Chalkovski, Musorgskii** Spring. 1 credit. Prerequisite: reading knowledge of Russian. Limited to students concurrently enrolled in Music 218.

Seminar to be arranged.  
For description see Music 218.

**[221 Popular Music]** Spring. 3 credits. No previous formal training in music is required. Not offered 1983–84.  
M W F 12:20. Staff.]

**222 History of Jazz** Spring. 3 credits. No previous formal training in music is required.  
M W 11:15; 1 disc hour to be arranged.  
B. Kernfeld.

Lectures will be devoted to a musical survey of jazz from around 1900 to the 1970s. Sections will emphasize progressive exercises in the fundamental rhythmic, harmonic, and tone-coloristic aspects of jazz. Focus: the recorded anthology *Smithsonian Collection of Classical Jazz*.

**274 Opera** Fall. 3 credits.  
M W 12:20. A. Groos, R. Parker, S. Williams.  
A team-taught introduction to major repertory works, with discussion of texts and theatrical performance as well as music. Operas surveyed will span the period from Mozart to modern times, with emphasis on works by Mozart, Verdi, and Wagner. Video recordings will be an integral part of the course; optional trips to live performances will be scheduled where possible. (See also Music 374, German Literature 374, and Theater Arts 337.)

**[277 Baroque Instrumental Music]** Fall. 3 credits.  
Prerequisite: Any 3- or 4-credit course in music, or permission of instructor. Not offered 1983–84.]

**[281 Music of the Baroque Period]** Fall or spring, every third semester. 3 credits. Prerequisite: any 3- or 4-credit course in music, or permission of instructor. Not offered 1983–84.]

**282 Music of the Classical Period** Fall or spring, every third semester. 3 credits. Prerequisite: any course in music, or permission of instructor.  
Fall 1983: M W 1:25. J. Webster.

The history of music from the emergence of Classical style in the mid-eighteenth century through its dissolution after 1815; its relations to new genres like symphony, string quartet, and piano sonata and its effects on old genres such as opera, church music, and concerto. Emphasis on music of Haydn, Mozart, and Beethoven.

**283 Music of the Romantic Era** Fall or spring, every third semester. 3 credits. Prerequisite: any 3- or 4-credit course in music, or permission of instructor.  
Spring 1984: M W 1:25. R. Parker.

The history of music from Schubert to Mahler, with a preliminary consideration of Beethoven. The course will concentrate on major figures and focus attention on the following genres: solo song, piano music, chamber music, orchestral music, opera.

**369 Debussy to the Present** Fall. 4 credits.  
Prerequisite: Music 152 or permission of instructor.  
M W F 11:15. W. W. Austin.

Study of selected pieces illustrating the diversity of twentieth-century musical techniques and purposes, the connections among composers through several generations, the unpredictability of their stylistic developments, and the freedom of students to develop their own connected interpretations of history. Techniques of composition and analysis (see Music 352, 654, 669, 670) are subordinated in this course to critical biography in social perspectives.

Composers considered will include Copland, Cage, Crumb, Reich, and Dylan as well as many Europeans.

**[373 Music and Poetry in France: Late Middle Ages and Renaissance (also French 617)]** 4 credits. Not offered 1983–84.  
D. Randel, E. P. Morris.]

**374 Opera** Fall. 4 credits. Prerequisite: Music 152 or equivalent.

M W 12:20 plus 1 disc. to be arranged. A. Groos, R. Parker, S. Williams.

The same as Music 274, but with one additional meeting a week devoted to technical discussion of individual works.

**[377 Mozart: His Life, Works, and Times (also German 387)]** 4 credits. Not offered 1983–84.  
N. Zaslav, S. L. Gilman.]

**[381 Music of the Baroque Period]** Fall or spring, every third semester. 4 credits. Prerequisite: Music 152 or equivalent. Not offered 1983–84.  
M 1:25, W 2:30–4:25. N. Zaslav.]

**382 Music of the Classical Period** Fall or spring, every third semester. 4 credits. Prerequisite: Music 152 or equivalent.

Fall 1983: M 1:25, W 2:30–4:25. J. Webster.  
The same as Music 282, but with two hours each week devoted to technical discussion of individual works, in place of one hour of 282.

**383 Music of the Romantic Era** Fall or spring, every third semester. 4 credits. Prerequisite: Music 152 or equivalent.

M 1:25, W 2:30–4:25. R. Parker.  
The same as Music 283, but with two hours each week devoted to technical discussion of individual works, in place of one hour of 283.

**[389 The Study of Non-Western Musics]** 4 credits.  
Prerequisite: Music 152 or permission of instructor. Not offered 1983–84.  
M. Hatch.]

**[474 Poetry and Music in the English Renaissance (also English 426)]** Spring. 4 credits. Not offered 1983–84.  
M W F 12:20. E. Murray, B. Rosecrance.]

**[481 Music in Western Europe to Josquin des Pres]** Fall. 4 credits. Prerequisite: Music 381, 382, or 383, or permission of instructor. Not offered 1983–84.  
T R 10:10–11:25. D. Randel.]

**[482 Josquin des Pres to Monteverdi]** Spring. 4 credits. Prerequisite: Music 381, 382, 383, or permission of instructor. Not offered 1983–84.  
T R 10:10–11:25. D. Randel.]

## Independent Study

**301–302 Independent Study in Music** 301, fall; 302, spring. Credit to be arranged. Prerequisite: departmental approval.  
Hours to be arranged. Staff.

## The Honors Program

**401–402 Honors in Music** 401, fall; 402, spring. 4 credits each term. Limited to honors candidates in their senior year.  
Staff.

## Musical Performance

**321–322 Individual Instruction in Voice, Organ, Harpsichord, Piano, Strings, Woodwinds, Brass, and Guitar** The number of places is strictly limited. Prerequisite: successful audition with the instructor. Students may register only with the prior permission

of the instructor. Students may register for this course in successive years. For information, consult the music department office, Lincoln Hall.

**Lessons without credit:** Students may sign up for individual instruction in music performance, with permission of the instructor only, following a successful audition. The fee for one half-hour lesson weekly, without credit, during the term is \$90. For a one-hour lesson or two half-hour lessons without credit the fee is \$180. Practice-room fees for six hours weekly are \$22 per term for a room with a piano; \$7 for a room without a piano; \$45 for use of a pipe organ.

**Lessons for credit** (Music 321–322): Advanced students, at the sole discretion of the instructor, may earn 2 credits each term for a one-hour lesson (or two half-hour lessons) weekly accompanied by an appropriate practice schedule. The student must have earned, or currently be earning, at least 3 credits in Music courses (not including Freshman Seminars, Music 122, 321–322, 331 through 338, 391–392, or 441 through 450). The fee for a one-hour lesson (or two half-hour lessons) weekly, for credit, during the term is \$135. Practice-room fees for twelve hours weekly are \$33 per term for a room with a piano; \$10 for a room without a piano; \$67.50 for use of a pipe organ.

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 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.)

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. Lesson-fee scholarships apply, when awarded, in the same amounts as those for lessons taken at Cornell.

**321a–322a Individual Instruction in Voice** 321a, fall; 322a, spring. 2 credits each term.  
Hours to be arranged. B. Troxell.

**321b–322b Individual Instruction in Organ** 321b, fall; 322b, spring. 2 credits each term.  
Hours to be arranged. D. R. M. Paterson.

**321c–322c Individual Instruction in Piano** 321c, fall; 322c, spring. 1–2 credits each term.  
Hours to be arranged. M. Bilson and staff.

**321d–322d Individual Instruction in Harpsichord** 321d, fall; 322d, spring. 2 credits each term.  
Hours to be arranged. D. R. M. Paterson.

**321e–322e Individual Instruction in Violin or Viola** 321e, fall; 322e, spring. 2 credits each term.  
Hours to be arranged. S. Monosoff.

**321f–322f Individual Instruction in Cello or Viola da Gamba** 321f, fall; 322f, spring. 2 credits each term.  
Hours to be arranged. J. Hsu.

**321g–322g Individual Instruction in Brass** 321g, fall; 322g, spring. 2 credits each term.  
Hours to be arranged. M. Stith.

**321h–322h Individual Instruction outside Cornell** 321h, fall; 322h, spring. 2 credits each term.  
Hours to be arranged. Staff.  
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, 125 Lincoln Hall.

**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 towards the cost of lessons. 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.

**331–332 Sage Chapel Choir** 331, fall; 332, spring. 1 credit. No audition for admission.  
M 7–8:30 p.m., R 7–8:30 p.m., Sunday 9:30 a.m.  
D. R. M. Paterson.

**333–334 Cornell Chorus or Glee Club** 333, fall; 334, spring. 1 credit. Prerequisite: permission of instructor.  
Chorus: T 7:15–9:15 p.m., plus 2 hours to be arranged. Glee Club: W 7:15–9:15 p.m., plus 2 hours to be arranged. T. A. Sokol, B. Adams.

**335–336 Cornell Orchestra** 335, fall; 336, spring. 1 credit. Prerequisite: permission of instructor. Chamber orchestra limited to more experienced players.  
Rehearsals for the Cornell Symphony Orchestra: full orchestra, W 7:30–10 p.m.; sectional rehearsals, alternate T or R 7:30–10 p.m.  
Rehearsals for the Cornell Chamber Orchestra, R 7:30–10 p.m. E. Murray.

**337–338 University Bands** 337, fall; 338, spring. 1 credit.  
Symphonic band: fall or spring, T and W 4:30–5:45. Wind ensemble: fall, M 7:30–9:30 p.m.; spring, M 7:30–9:30 p.m. and R 4:30–5:45.  
E. Gobrecht, M. Stith.

Students interested in participating in the Big Red Marching Band may inquire at the Department of Athletics, Teagle Hall.

**441–442 Chamber Music Ensemble** 441, fall; 442, spring. 1 credit. Prerequisite: permission of instructor.  
S. Monosoff.

Study and performance of chamber music literature; string and wind groups; piano trios and quartets, trio sonatas, etc. Emphasis on musical problems, with some practice in sight reading.

**443–444 Chamber Singers** 443, fall; 444, spring. 1 credit. Prerequisite: permission of instructor.  
F 4:30–6. T. A. Sokol.  
Study and performance of selected vocal music for small choir.

**445–446 Cornell Gamelan Ensemble** 445, fall; 446, spring. 1 credit. No previous knowledge of music notation or experience in music performance necessary. Attendance at all full rehearsals and one small group lesson per week required for credit.  
Full ensemble: R 7:30–10 p.m. Small group lessons: M W F 12:20–1:10. M. Hatch.

Basic performance techniques and theories of central Javanese gamelan. Tape recordings of gamelan and elementary cypher notation are provided. Some instruction by Indonesian musicians is offered in most years.

**447–448 Collegium Musicum** 1 credit.  
Prerequisite: permission of instructor.  
Hours to be arranged. J. Hsu.  
Study and performance of medieval, Renaissance, and baroque vocal and instrumental music, with recorders, crumhorns, sackbuts, viols, shawns, organ, harpsichord, and other early instruments.

**[449–450 Eighteenth-Century Orchestra]** 1 credit. Prerequisite: permission of instructor. Not offered 1983–84.  
R 7:30–10 p.m. S. Monosoff.]

## Graduate Courses

Open to qualified undergraduates with permission of instructor.

**601 Introduction to Bibliography and Research** Fall. 4 credits.  
M 1:30–4:25. L. Coral.

**653 Topics in Tonal Theory and Analysis** Spring. 4 credits.  
M 1:30–4:25. J. Feigin.  
Topic for 1984: The chorales of J. S. Bach.

**654 Topics in Twentieth-Century Theory and Analysis** Fall. 4 credits.  
R 1:30–4:25. R. Parker.  
Topic for 1983: Stravinsky. Analytical approaches to selected works, 1925–1940, with particular attention to the *Symphony of Psalms* and *Oedipus Rex*.

**[657]–658 Composition** 657, fall; 658, spring. 4 credits each term. [657: not offered 1983–84.] 658: W 2:30–4:25. S. Stucky.

**659–[660] Composition** 659, fall; 660, spring. 4 credits each term. [660: Not offered 1983–84.] 659: T 2:30–4:25. K. Husa.

**[662 Orchestral Conducting]** Spring. 4 credits. Not offered 1983–84.  
T 10:10–12:05. K. Husa.]

**669–670 Debussy to the Present** 669, fall; 670, spring. 4 credits each term.  
669: M W F 11:15; 1 disc hour to be arranged.  
W. W. Austin. 670: R 1:30–4:25. S. Stucky, with W. W. Austin.

669: Lectures and discussion of Music 369, supplemented by analytical and bibliographical studies appropriate for graduate students. 670: A continuation of Music 669, but with emphasis on analysis of individual works of recent music. No single or systematic analytical method is essayed; rather, each work studied is approached in its own terms, with opportunity to explore a variety of analytical techniques.

**[673 Music and Poetry in France: Late Middle Ages and Renaissance (also Music 373 and French 617)]** Fall. 4 credits. Not offered 1983–84.  
D. M. Randel, E. P. Morris.]

**[677 Mozart: His Life, Works, and Times (also German 757)]** Fall. 4 credits. Not offered 1983–84.  
N. Zaslaw, S. L. Gilman.]

**680 Introduction to Ethnomusicology** Fall. 4 credits. Open to graduate students in anthropology, linguistics, psychology, sociology, and other cognate fields with permission of instructor.  
W 2:30–4:25, plus 1-hour lab to be arranged.  
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. Past and present traditions of translation and transcription of words and tones in musical scholarship and the literatures of music.

**681–682 Seminar in Medieval Music** 681, fall; 682, spring. 4 credits each term.

T 1:30–4:25. D. Randel.

681: The development of rhythmic notation in the West through the fifteenth century. 682: French secular vocal music of the late fourteenth and early fifteenth centuries.

**[683–684 Seminar in Renaissance Music** 683, fall; 684, spring. 4 credits each term. Not offered 1983–84.

T 1:30–4:25. D. Randel.]

**[685–686 Seminar in Baroque Music** 685, fall; 686, spring. 4 credits each term. Not offered 1983–84.]

**[687]–688 Seminar in Music of the Classical Period** 4 credits each term. [687: Not offered 1983–84.]

688: W 1:30–4:25. J. Webster.

Topic for spring 1984: Beethoven, with particular attention to the overture to Collin's tragedy *Coriolan*.

**[689–690 Seminar in Music of the Romantic Era** 689, fall; 690, spring. 4 credits each term. Not offered 1983–84.]

**[691–692 Performance Practice** 691, fall; 692, spring. 4 credits each term. Not offered 1983–84.

T 2:30–4:25. N. Zaslaw.]

**697–698 Independent Study and Research** 697, fall; 698, spring.

Hours and credits to be arranged. Staff.

**[785–786 History of Music Theory** 785, fall; 786, spring. 4 credits each term. Not offered 1983–84.

J. Webster.]

**[789 Liturgical Chant in the West** Spring. 4 credits. Not offered 1983–84.

D. Randel.]

## Near Eastern Studies

G. Korman, acting chairman; M. F. Collins (on leave 1983–84), U. Dann (Shiloah visiting professor), C. Kronfeld, P. D. Molan (on leave spring 1984), D. I. Owen (director of Program of Jewish Studies), D. S. Powers (director of undergraduate studies [on leave fall 1983]), N. Scharf

### The Department

The Department of Near Eastern Studies offers courses in the archaeology, 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.

### The Major

The student who majors in Near Eastern Studies may concentrate in one of the following five areas:

- I. Near Eastern Languages and Literatures
- II. Ancient Near Eastern Studies
- III. Judaic Studies
- IV. Islamic Studies
- V. Contemporary Near Eastern 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).
- 3) Four courses in subjects related to the student's concentration, which may, 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.

**Study abroad.** Near Eastern studies majors may choose to study in the Near East in their junior year. There are various academic programs in Israel and Egypt that are recognized by the Department of Near Eastern Studies and that allow for the transfer of credit. Archaeological fieldwork on Cornell-sponsored projects in the Near East or recognized field schools in Israel may also qualify for course credit.

**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– or better and have demonstrated superior performance in Near Eastern studies courses. 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.

### Program of Jewish Studies

The field of Jewish studies encompasses a broad spectrum of disciplines that includes language, literature, philology, and history. The Department of Near Eastern Studies offers students the opportunity to take a wide variety of courses in Jewish studies whose subjects are not represented in this department. Students interested in planning a program in Jewish studies should consult the Department of Near Eastern Studies. For further details see Program of Jewish Studies under Special Programs and Interdisciplinary Studies, p. 210.

### Freshman Seminars

**[125 Freshman Seminar in Biblical Literature: Heroes and Heroines of the Bible** Fall 3 credits. Not offered 1983–84.]

**154 Harems, Houris, and Hashish: Western Perceptions of the Middle East** Spring. 3 credits.

T R 12:20. D. S. Powers.

Societies acquire their identities in part by defining themselves against foreigners, strangers, aliens, or enemies. We divide the world into the familiar (Europe, the West, "us") and the strange (the Orient, the East, "them"). Our tendency to view the East as sensual, irrational, and fatalistic reflects Western power and dominance. In this course we will explore how contemporary Western perceptions of the Middle East have been shaped by the imperial and colonial experience of the past 150 years, paying special attention to the role of power and politics in the production of culture and knowledge.

**157 Of Oil, Arms, and Anguish: Aspects of Modern Arab Thought** Fall. 3 credits.

T R 12:20–1:35. P. D. Molan.

Arab-Israeli wars! Palestinian "terrorists"! Oil embargoes! Most Americans think of Arabs as people in funny clothes riding around on camels or in Cadillacs (at our expense) to do violence, but we see

Arabs through a prism of Western bias and prejudice. Arabs see themselves as heirs to, and bearers of, a glorious cultural tradition, but they also see themselves as nationally fragmented and politically, economically, and philosophically unable to control their own destinies. Why? Our seminar explores the "Arab predicament" through the writings of major Arab authors. Reading them we may become more sensitive to another people and to our own modes of understanding the world.

### Language Courses

**101–102 Elementary Modern Hebrew I and II**

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.

Sec 1, M–F 9:05; sec 2, M–F 10:10; sec 3, M–F 1:25. N. Scharf.

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.

**103 Elementary Modern Hebrew: Second Semester**

Summer. 4 credits. Prerequisite: one semester of college Hebrew or permission of instructor.

M–F 9–1. N. Scharf.

Fundamentals of grammar, syntax, and vocabulary as applied to both conversation and written Hebrew in the modern idiom. Satisfactory completion of this course and a passing grade on a special section of the final examination fulfills the qualification portion of the language requirement.

**[111–112 Elementary Arabic** 111, fall; 112, spring. 6 credits each term. Prerequisite for NES 112: 111 or permission of instructor. Not offered 1983–84.]

**121–122 Elementary Classical Hebrew** 121, fall; 122, spring. 4 credits each term. Prerequisite for NES 122: 121 or equivalent with permission of instructor.

M W F 2:30. Staff.

An introduction to Biblical Hebrew that focuses on acquisition of basic language structures and vocabulary and on fluency in reading and translating. In the second term, readings include the Book of Ruth and selections from the Book of Genesis. This course provides the basis for understanding the role of Biblical Hebrew in shaping Modern Hebrew and for the study of the historical development of the Hebrew language.

**[131–132 Introduction to the Turkish Language (also Turkish 131–132)** 131, fall; 132, spring. 3 credits each term. Not offered 1983–84.]

**[171–172 Elementary Yiddish** 171, fall; 172, spring. 4 credits each term. Not offered 1983–84.]

**183–184 A Self-Instructional Language Course for Beginners: Elementary Persian** 183, fall; 184, spring. 6 credits each term. No prerequisites.

Staff. (Contact P. Molan for information.)

Students work on their own for five hours per week and with a native informant for two hours of drill per week. Tests are periodically administered by faculty-level examiners. The goal is to achieve a sound grounding in all language skills, but a high level of self-motivation and discipline is required. The course is offered only if there is sufficient enrollment.

**201–202 Intermediate Modern Hebrew I and II**

201, fall; 202, spring. 3 credits each term.

Prerequisite for NES 201: 102 or permission of instructor. Prerequisite for NES 202: 201 or permission of instructor. Satisfactory completion of NES 202 fulfills the proficiency portion of the language requirement.

M W F 12:20. N. Scharf.

Second-year modern Hebrew. Continued development of reading, writing, composition, listening, and speaking skills.

**211–212 Intermediate Arabic** 211, fall; 212, spring. 3 credits each term. Prerequisite for NES 211: one year of Arabic or permission of instructor. Prerequisite for NES 212: 211 or permission of instructor.

Fall: M W F 9:05, P. D. Molan. Spring: T R 10:10, D. S. Powers.  
The basic structures of literary Arabic are reviewed and reinforced. An appreciation for syntax is developed through readings in classical and modern texts.

**213 Introduction to Egyptian Arabic and to Problems of Arabic Dialectology** Fall 6 credits  
No prerequisites. All texts in Roman alphabet.  
M–F 10:10. P. D. Molan.

Students learn the basic structures of Egyptian spoken Arabic, probably the most widely known of Arabic dialects and a major vehicle for popular Arabic culture. One hour per week will be devoted to the history and development of the Arabic language with special reference to the problem of the relationship between "classical" and dialectal Arabic. The impact of European languages on modern Arabic will be assessed and some comparisons with modern Hebrew will be drawn.

**[238 Aramaic]** Spring. 3 credits. Not offered 1983–84 ]

**301–302 Advanced Modern Hebrew I and II** 301, fall; 302, spring. 4 credits each term. Entire sequence may be repeated for credit. 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. Material varies from one year to the next.

T R 10:10–11:25. C. Kronfeld.  
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.

**[311 Advanced Arabic: The Short Story]** Fall. 4 credits. Prerequisite: NES 212 or permission of instructor. Not offered 1983–84 ]

**[312 Advanced Arabic: Qur'an and Tafsir]** Spring. 4 credits. Not offered 1983–84 ]

**333–334 Elementary Akkadian** 333, fall; 334, spring. 4 credits each term.  
Hours to be arranged. Staff.  
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.

**335–336 Readings in Akkadian Texts** 335, fall; 336, spring. 3 credits. Prerequisite: NES 333–334.  
Hours to be arranged. D. I. Owen.  
Selected readings in Akkadian texts.

**[337 Ugaritic]** Fall. 3 credits. Not offered 1983–84 ]

## Archaeology

**[243 The History and Archaeology of Ancient Israel to 450 B.C.E.]** Spring. 4 credits. Not offered 1983–84 ]

**261 Ancient Seafaring (also Archaeology 275)** Summer. 3 credits.

M–F 9–10:15, 10:45–12. D. I. Owen.  
Surveys the history and development of archaeology under the sea. Focuses on the role of nautical technology and seafaring and the development of the sailing ships among the maritime peoples of the ancient Mediterranean world and the riverine cultures of Egypt, Mesopotamia, and the Indus Valley. Archaeological and literary evidence for maritime trade, economics, exploration, and colonization as well as the role of the sea in religion and mythology is discussed.

**[262 Mediterranean Archaeology (also Classics 200)]** Fall. 3 credits. Not offered 1983–84 ]

**[263 Introduction to Biblical Archaeology]** Summer. 3 credits. Not offered 1983–84 ]

**[361 Interconnections in the Eastern Mediterranean World in Antiquity]** Fall. 4 credits. Not offered 1983–84.]

**362 The History and Archaeology of Ebla** Spring. 4 credits. Prerequisite: Archaeology 100 or any introductory course in ancient history or archaeology.  
T R 12:20–1:35. D. I. Owen.

A detailed survey of the history and archaeology of the newly discovered civilization of Ebla, based on the latest archaeological and textual publications. The position of Ebla in the history and archaeology of the third millennium as a bridge between Mesopotamia and Egypt will be emphasized. Significant texts in Eblaite and Sumerian will be read in translation.

**364 Introduction to Field Archaeology in Israel** Summer. 6 credits.  
D. I. Owen.

An introduction to archaeological 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.

**365 The History and Archaeology of the Divided Monarchy from the Death of Solomon to the Destruction of Jerusalem, 922–586 B.C.E.** Fall. 4 credits. Prerequisite: NES 243 or permission of instructor.

T R 2:30–3:45. D. I. Owen.  
The political history of the monarchies of Israel and Judah is one of the best-documented periods in the history of ancient Israel. This course will examine in detail the complex textual and extensive archaeological evidence for this period, focusing on the political, cultural, and religious rivalries that beset Israel and Judah within the context of their respective relationships with the Phoenicians, Egyptians, Assyrians, and Babylonians.

**366 The History and Archaeology of the Ancient Near East (also Archaeology 310)** Fall. 4 credits. Prerequisite: Archaeology 100 or permission of instructor.

T R 12:20–1:35. D. I. Owen.  
A survey of the history and archaeology of the major civilizations of the Near East from the Persian Gulf to Syria and covering the time span from the prehistoric period to the Persian conquest. Sumerian, Akkadian, Elamite, Eblaite, West Semitic, Assyrian, Babylonian, and Persian cultures will be discussed with emphasis on indigenous development as well as cross-cultural contacts.

**[367 The History and Archaeology of Ancient Egypt]** Fall. 4 credits. Not offered 1983–84 ]

**[461 Seminar in Syro-Palestinian Archaeology: The Israelite Conquest of Canaan]** Fall. 4 credits. Not offered 1983–84 ]

## History

**[151 Islamic Civilization]** Fall. 3 credits. Not offered 1983–84 ]

**[152 Islam in the Modern World]** Spring. 3 credits. Not offered 1983–84.]

**241 The Holocaust: European Jewry, 1933–45** Summer. 3 credits.

M–F 11:30–12:45. G. Korman.  
An examination of the destruction of European Jewry 1933–45, focusing on the dynamics of European and Nazi anti-Semitism as well as on the character of the European Jewish community. Topics include regional variations in policy toward Jews in Nazi-occupied Europe, the Allied response, Jewish resistance, and the Jewish Councils. Readings of primary sources in English translation are stressed.

**[243 History of Ancient Israel to 450 B.C.E.]** Spring. 4 credits. Not offered 1983–84 ]

**[245 The Emergence of the Modern Jew, 1648–1948]** Spring. 4 credits. Not offered 1983–84.]

**[252 Islamic Law and Society]** Spring. 3 credits. Not offered 1983–84 ]

**[258 Islamic History 600–1050]** Spring. 3 credits. Not offered 1983–84 ]

**261 Ancient Seafaring (also Archaeology 275)** For description see under Near Eastern Archaeology, above.

**294 Modern History of the Middle East: Changing Politics, Society, and Ideas (also Government 358)** Fall. 4 credits.

Fall: M W F 1:25; summer: M–F 1–2:25. U. Dann.  
An introduction to the history of Turkey, the Arab lands, Israel, and Iran since the beginnings of modernization at the end of the eighteenth century to the present. The main focus is on the clash between traditional society and the West, and the changing social patterns, political systems, and ideologies in this context.

**[343 The Jewish Community throughout History]** Spring. 4 credits. Not offered 1983–84.]

**346 Jews of Arab Lands** Spring. 3 credits.  
W 1:25–3:25. D. S. Powers.

The continuing conflict in the Middle East has made the topic of the historical relations between Jews and Arabs one of urgent significance. The present course seeks to explore the nature of the Jewish experience under Arab rule from the advent of Islam and the Arab conquests (when the majority of world Jewry came under Muslim rule), through the flourishing of Jewish culture during the Islamic High Middle Ages, to the decay of the Muslim world and the rise of the West. Topics to be considered will include the contribution of Judaism to the formation of Islamic civilization; the social, economic, and legal status of Jews living in Arab countries; Judaeo-Islamic culture; and mutual perceptions of Arabs and Jews in modern times.

**[361 Interconnections in the Eastern Mediterranean World in Antiquity]** Fall. 4 credits. Not offered 1983–84.]

**362 The History and Archaeology of Ebla** For description see under Near Eastern Archaeology, above.

**365 The History and Archaeology of the Divided Monarchy from the Death of Solomon to the Destruction of Jerusalem, 922–586 B.C.E.** For description see under Near Eastern Archaeology, above.



**366 Archaeology of the Ancient Near East (also Archaeology 310)** Fall. 4 credits.  
For description see under Near Eastern Archaeology, above.

**[367 The History and Archaeology of Ancient Egypt]** Fall. 4 credits. Not offered 1983–84.]

**[381 Jewish Workers in Europe and America (also Industrial and Labor Relations 381)]** Spring 4 credits. Not offered 1983–84.]

**398 Seminar in Contemporary Near Eastern Society (also Government 353)** Spring 4 credits  
An advanced seminar examining the society and politics of different countries in the Near East.

## Literature

**205 Masterpieces of Jewish Literature (also Comparative Literature 205)** Fall 4 credits. No prerequisites.

T 2:30–5. C. Kronfeld.

A reading of the major works of Hebrew and Yiddish literature in English translation, as well as a selection from Sephardi literature in Jewish languages such as Ladino and Judeo-Arabic. The course combines a historical and a comparative perspective and offers both a close reading of the literary works and an examination of the context in which they were produced. Readings span a variety of genres and periods from the Bible to Agnon and Amichai, from Mendele and Sholem Aleichem to Manger and Bashevis-Singer. Students will have the option of reading the texts in the original Hebrew and/or Yiddish.

**[207 Modern Hebrew Literature in Translation: Modern Hebrew Poetry]** Fall. 3 credits. Open to freshmen. Not offered 1983–84.]

**[208 Modern Hebrew Literature in Translation: The Modern Hebrew Short Story]** Spring 3 credits  
Open to freshmen. Not offered 1983–84.]

**[221–222 Readings in Classical Hebrew Literature: The Art of Biblical Narrative]** 221, fall; 222, spring. 3 credits each term. Not offered 1983–84.]

**[225 Judaic Literature in Late Antiquity: Dead Sea Scrolls and Sectarian Literature]** Spring 3 credits. Not offered 1983–84.]

**[251 Studies in the Popular and Courtly Literatures of the Islamic Middle East]** Fall. 3 credits. Not offered 1983–84.]

**[254 Society, Politics, and the Modern Arabic Novel]** Fall. 3 credits. Not offered 1983–84.]

**[256 The Arabian Nights in the East and the West]** Spring. 3 credits. Not offered 1983–84.]

**[291 Tradition and the Literary Imagination]** Fall. 3 credits. Not offered 1983–84.]

**[292 The Hebrew Literary Imagination]** Spring. 3 credits. Not offered 1983–84.]

**[303 Seminar in Modern Hebrew Literature: The Short Story]** Fall. 4 credits. Not offered 1983–84.]

**[304 Seminar in Modern Hebrew Literature: The Novel]** Spring. 4 credits. Not offered 1983–84.]

**[308 Agnon and Hazaz]** Spring. 4 credits. Not offered 1983–84.]

**[322 Undergraduate Seminar in Biblical Literature: Prophecy in Ancient Israel]** Spring. 4 credits. Prerequisite: one course in Bible or literature. Not offered 1983–84.]

**332 Ancient Near Eastern Literature]** Spring. 4 credits.

T R 2:30–3:45. D. I. Owen.

Readings in translation from major and minor literary works of the Sumerians, Eblaïtes, Akkadians, Babylonians, Hittites, Canaanites, Hebrews, and Egyptians. Selections from epical, religious, magical, and historical genres. Discussion of epic themes, mythological systems, and a comparison of literary and mythological motifs with later biblical and Greek literature.

**[342 Biblical Interpretation in Rabbinic Literature]** Spring. 4 credits. Not offered 1983–84.]

**[375 The Shtetl in Modern Yiddish Fiction in English Translation (also German Literature 375)]** Fall. 4 credits. Not offered 1983–84.]

**[377 Topics in Yiddish Literature (also German Literature 377)]** Spring. 4 credits. Not offered 1983–84.]

**391–392 Parents and Children in Athens and Jerusalem (also Society for the Humanities 381–382 and History 381–382) Frederick G. Marcham Seminar]** 391, fall; 392, spring. 4 credits.  
Prerequisite: permission of instructor.

Fall: W 2:30–4:30. Spring: independent study.  
C. Kronfeld, B. Strauss.

The focus is on the images and reality of parent-child relations in ancient Athens and Israel, with masterpieces of these two central Mediterranean cultures serving as main texts. Questions to be examined both from the historian's and from the literary critic's point of view include parenthood in the Homeric epic and in biblical narrative, generation gap and the tension between emulation and rebellion, gender stereotypes of parent and child images, and the theme of war and child sacrifice. For comparative purposes attention will also be paid to the images of parent-child relations in modern Greece and Israel as well as in the Greek and Jewish diasporas. Students who wish to read the literature in the original languages will be supplied with the appropriate texts.

**402 The Poetics of Modernism in Literature and Art: Paris, New York, Tel Aviv (also Comparative Literature 402)]** Spring. 4 credits. Prerequisite: a 200-level or above course in one of the following: English or comparative literature, Hebrew or Yiddish, history of art or aesthetics.

R 2:30–4:40. C. Kronfeld.

This seminar investigates the theory and practice of Euro-American modernist movements in literature and art and their influence on the emergence of modernism in Israel. The manifestos of the various movements will be analyzed against the poetic and artistic principles embedded in the works themselves. Special emphasis will be placed on expressionism and surrealism and on the methodological difficulties of discussing "-isms" across media and cultures.

**[405 Metaphor, Modernism, and Cultural Context: The Use of Metaphor in Modernist Hebrew, Yiddish, English, and American Poetry (also Comparative Literature 405)]** Not offered 1983–84.]

**457 Contemporary Arab Thought]** Fall. 3 credits.  
Prerequisite: NES 294, its equivalent, or permission of instructor.

Hours to be announced. P. D. Molan.

This tutorial seminar will examine the thought of a number of internationally recognized Arab authors. Students will prepare a substantial research paper on a problem in contemporary Arab society.

## Special Topics and Independent Study

**341–342 Special Topics in Near Eastern Studies]** 4 credits. Limited to 25 students; preference will be determined by class standing and prior enrollment in Near Eastern Studies

Hours to be arranged. Staff.

An examination of especially significant subjects in the field of Near Eastern studies. The course will be taught by one or more members of the department, enriched by visiting lecturers, and usually require a tutorial relationship between participating faculty members and one to five students.

## Independent Studies

**491–492 Independent Study, Undergraduate Level]** Fall or spring. Variable credit. Prerequisite: permission of instructor.  
Staff.

**499 Honors Seminar: Independent Study]** Fall or spring. Variable credit. Prerequisite: permission of instructor.  
Staff.

**691–692 Independent Study, Graduate Level]** Fall or spring. Variable credit. Prerequisite: permission of instructor.  
Staff.

## Related Courses in Other Departments

### Archaeology

**Freshman Seminar in Classical Archaeology (Classics 121)**

**[Introduction to Medieval Latin (Classics 214)]** Not offered 1983–84.]

**Introduction to Classical Archaeology (Classics 220)**

**Introduction to Classical Archaeology (Art History 220)**

**[Minoan-Mycenaean Art and Archaeology (Classics 221)]** Not offered 1983–84.]

**Archaeology in Action (Classics 121)**

**[New Testament Greek (Classics 308)]** Not offered 1983–84.]

**Aegean Dendrochronology (Classics 309)**

**[The Archaeology of Cyprus (Classics 321)]** Not offered 1983–84.]

**[Greeks and Their Eastern Neighbors (Classics 322)]** Not offered 1983–84.]

**[Art and Archaeology of Archaic Greece (Classics 326)]** Not offered 1983–84.]

**[Pagan and Christian at Rome (Classics 322)]** Not offered 1983–84.]

**Problems in Minoan-Mycenaean Archaeology (Classics 629)**

### Economics, Government, and Sociology

**[Sociology of War and Peace (Sociology 310)]** Not offered 1983–84.]

**Comparative Economics (Economics 368)]** Spring.

**[Eastern Europe Today (Government 326)]** Not offered 1983–84.]

**Government and Politics of the Soviet Union (Government 333)**

**[The Ethnic Dimensions in Politics (Government 336)** Not offered 1983–84.]

**Politics of the Military (Government 349)** Fall.

**[Comparative Revolutions (Government 350)** Not offered 1983–84.]

**America in the World Economy (Government 354)** Spring.

**Theories of International Relations (Government 383)** Spring.

**Contemporary American Foreign Policy (Government 385)**

## History

**History of American Foreign Policy (History 314)**

**Church and State During the Middle Ages (History 367)**

**[Survey of German History (History 358)** Not offered 1983–84.]

**[Russian History since 1800 (History 368)** Not offered 1983–84.]

**[Europe in the Twentieth Century (History 383–384)** Not offered 1983–84.]

## Literature

**Christianity and Judaism (Comparative Literature 326)**

**Old Testament Seminar (Comparative Literature 421)**

## Philosophy

D. B. Lyons, chairman; J. G. Bennett, R. N. Boyd, G. Fine, C. A. Ginet, H. Hodes, C. Hughes, T. H. Irwin, N. Kretzmann, R. W. Miller, S. Shoemaker, R. C. Stalnaker (director of undergraduate studies, 228 Goldwin Smith Hall, 256-5000), N. L. Sturgeon, A. W. Wood

The study of philosophy provides students with an opportunity to become familiar with some of the great ideas and great works 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 fascinating and important intellectual problems. The curriculum includes substantial offerings in history of philosophy, logic, philosophy of mathematics and 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 Seminar program; they are taught by various members of the staff on a variety of philosophical topics, and because of their small size (twenty students at most), they provide ample opportunity for discussion. Students who want a broad introduction to philosophy may take Philosophy 101, Philosophical Classics, which focuses on recognized classics in the principal areas of philosophy. Philosophy 131, Logic, Evidence and Argument, deals with the analysis and evaluation of arguments of all sorts. It is not a general introduction to philosophy, but the skills it develops are useful in all areas of study, including philosophy. Many students with special interests 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. Eight philosophy courses are required for the major. They must include at least one course in ancient philosophy, at least one course in the history of philosophy other than ancient philosophy, and a minimum of three courses numbered above 300, at least one of which must be numbered above 400 (with the exception of 490).

A course in mathematical logic (either Philosophy 231 or 331), 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 a 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. Prospective candidates should apply at the Department of Philosophy 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.

**100 Freshman Seminar in Philosophy** Fall or spring. 3 credits. Limited to freshmen who have not taken Philosophy 101. Independent sections, each limited to 18 students. Letter grade only.

Fall: M W F 9:05, staff; M W F 11:15, R. Stalnaker; M W F 12:20, 1:25, or 2:30, staff; T R 10:10, C. Ginet; T R 12:20 or 2:30, staff. Spring: M W F 9:05 or 11:15, staff; M W F 1:25, N. Sturgeon; M W F 2:30, staff; T R 8:40, staff; T R 10:10, H. Hodes; T R 12:20 or 2:30, staff.

**101 Introduction to Philosophy** Fall or spring. 3 credits.

Fall: M W F 9:05, T. H. Irwin. Spring: M W F 9:05, S. Shoemaker.

Readings in classic works of philosophy (such as Plato, Aquinas, Descartes, Hume, Mill, Russell) concerned with any of several central philosophical issues—foundations of knowledge, reality and illusion, the basis of morality, the existence of God.

**131 Logic: Evidence and Argument** Fall. 3 credits.

M W F 11:15, J. Bennett.

An introduction to the fundamental principles of inference, intended to systematize and develop skills in evaluating arguments. Both deductive and inductive arguments will be considered. The course is not a general introduction to philosophy but develops skills useful in all areas of study, including philosophy.

**[201 Philosophical Problems** Spring 4 credits. Not offered 1983–84.]

**211 Ancient Philosophy** Fall. 4 credits. No prerequisites.

T R 12:20–1:35, G. Fine.

A survey of the central theories of ancient Greek and Roman philosophical thought from its beginnings with

the pre-Socratics through its development in Socrates, Plato, and Aristotle; and the Stoics, Epicureans, and Sceptics. Topics to be considered include knowledge and reality; the nature of the cosmos; happiness, justice, and the function of man.

**212 Modern Philosophy** Spring. 4 credits.

T R 12:20–1:35, G. Fine.

A survey of some major philosophical problems in the rationalists, empiricists, and Kant. Typical problems include the nature and limits of knowledge; perception; the existence of God; free will and determinism; mind and body. Readings from Descartes, Spinoza, Locke, Berkeley, Hume, and Kant.

**[213 Existentialism** Not offered 1983–84.]

**[214 Philosophical Issues in Christian Thought** Not offered 1983–84.]

**[215 Medieval Philosophy** Not offered 1983–84.]

**231 Formal Logic** Spring. 4 credits.

M W F 11:15, 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 for students unsure of their mathematical aptitude or without mathematical background.)

**241 Ethics** Fall. 4 credits.

M W F 10:10, D. Lyons.

Introduction to the philosophical study of moral problems and ethical theories through both historical and contemporary sources. Topics typically include relativism and scepticism, egoism and utilitarianism, and one or more specific moral issues such as the enforcement of morals and obedience to law.

**242 Social and Political Theory** Fall. 4 credits

M W F 1:25, J. Bennett.

A historical survey of philosophical thinking about the nature and norms of human society, including such questions as the nature and limits of liberty, the function and justification of state authority, the origins of inequality, and the rationale for revolution. Classic works in social and political theory will be discussed in detail in an effort to analyze their main arguments, determining the views of psychology, society, and ethics on which they rest.

**[243 Aesthetics** Not offered 1983–84.]

**244 Philosophy and Literature** Spring. 4 credits.

M W F 1:25, T. H. Irwin.

What can literature contribute to the understanding of philosophical issues, and what can philosophy contribute to the understanding of literature? Issues to be discussed include morality, self and others; egoism and altruism; character and freedom; duty and inclination; utilitarianism and personal integrity. Readings include Sophocles' *Antigone*, *Ajax*, *Philoctetes*; Eliot's *Mill on the Floss*, *Middlemarch*, Tolstoy's *Anna Karenina*; Dickens's *Hard Times*.

**245 Biomedical Ethics (also Biological Sciences 205)** Fall. 3 credits. Limited to 100 students.

Primarily for sophomores, juniors, and seniors; permission of instructor required for graduate students.

M W F 1:25, C. Hughes.

Critical analysis of the conceptual framework in which ethical problems in biology and medicine are to be understood, debated, and solved. Problems include experimentation on living subjects; reproductive technologies (eugenics, population control); contraception, abortion, and infanticide; euthanasia and suicide; the allocation of scarce medical resources; physician-patient relationships; and health care systems.

**246 Environmental Ethics (also Biological Sciences 206)** Spring. 3 credits. Open to sophomores, juniors, and seniors; permission of instructor required for graduate students.  
M W F 1:25. C. Hughes.

Critical analysis of the conceptual framework in which environmental policies are formulated and judged. Problems include private interest versus the public good; the relation of individual rights to the collective welfare with respect to property, compensation, regulation, and the exercise of eminent domain; moral obligations to the poor and to future generations; and the ideas of diversity, balance, and stability in the natural environment.

**261 Knowledge and Reality** Spring. 4 credits  
M W F 10:10. R. Stalnaker.

A discussion of central questions concerning the nature of knowledge. Can we ever be certain about anything beyond our own immediate experience? Why is it reasonable to trust one's senses and memory? Can the principle of inductive reasoning be justified? Readings from the classical and contemporary sources.

**262 Philosophy of Mind** Fall. 4 credits

T—R 10:10—11:25. S. Shoemaker.  
Discussion of a number of problems about the nature of mind. For example, can thoughts and feelings be physical events in the brain? Might computers or robots be conscious beings? What is it that constitutes a person's identity—the unity of his consciousness? Is there a conflict between free will and determinism?

**[263 Religion and Reason** Not offered 1983–84 ]

**286 Science and Human Nature** Spring. 4 credits.  
M W F 9:05. R. 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. Topic for 1983–84: Darwin, social Darwinism, and sociobiology.

## Intermediate Courses

Some of these courses have prerequisites.

**309 Plato** Fall. 4 credits. Prerequisite: at least one previous course in philosophy or permission of instructor.

T R 2:30. G. Fine.  
A systematic survey of Plato's thought, from his earlier dialogues through the *Republic* and his later dialogues. Topics to be considered include knowledge and reality; the Theory of Forms; the nature of the sense; justice and happiness. No knowledge of Greek or of Greek philosophy is presupposed.

**310 Aristotle** Spring. 4 credits. Prerequisites: at least one previous course in philosophy, or permission of instructor.

T R 2:30. G. Fine.  
A systematic survey of Aristotle's thought, primarily in metaphysics. Topics to be considered include: substance, forms, and matter; essence and necessity; actuality and potentiality; explanation, teleology and functionalism. Special attention will be given to the *Organon*, *Physics*, and *Metaphysics*. No knowledge of Greek or of Greek philosophy is presupposed.

**311 Modern Rationalism** Spring. 4 credits.

M W F 2:30. C. Ginet.  
Topic for 1983–84: Descartes.

**312 Modern Empiricism** Fall. 4 credits.

M W F 9:05. N. Sturgeon.  
Locke, Berkeley, and Hume. Substance, causality, and necessity; meaning, the possibility of scientific and moral knowledge. Historical and critical emphasis, with some illustrations of influences on more recent empiricist theories.

**[314 Topics in Ancient Philosophy** Not offered 1983–84.]

**[315 Special Topics in the History of Philosophy** Not offered 1983–84.]

**316 Kant** Spring. 4 credits.

M W F 2:30. T. H. Irwin.  
Introduction to Kant's main doctrines in metaphysics, theory of knowledge, and ethics. Kant's place in the history of philosophy; how he tries to reconcile and transcend the best insights of rationalism and empiricism. Kant's new philosophical perspective; can we have knowledge of the world as it really is, or can we only know our way of seeing the world? Topics include the possibility of nonempirical knowledge and the basis of empirical knowledge; the nature of space and time and our knowledge of them; proof of the existence of an objective world (has Kant answered scepticism?); why events must have causes, and how we know they must have them; scientific law, determinism, and the possibility of free will; free will, reason, and the basis of morality.

**[317 Hegel** Not offered 1983–84 ]

**318 Twentieth-Century Philosophy** Spring. 4 credits.

M W F 11:15. S. Shoemaker.  
Topic for 1983–84: Russell, Moore, and Wittgenstein on the nature of knowledge.

**[319 Philosophy of Marx** Not offered 1983–84 ]

**331 Introduction to Formal Logic** Fall. 4 credits.

M W F 11:15. H. Hodes.  
Sentential logic and first-order quantification theory. Covers the same material as Philosophy 231 but in more depth and with additional metatheory. This is the recommended course, of the two, for students with good mathematical background or aptitude.

**332 Semantics** Fall. 4 credits. Prerequisite: at least one philosophy course, some background in logic.

M W F 1:25. R. Stalnaker.  
Introduction to the philosophy of language. Discussion of the nature of representation and communication, alternative conceptions of meaning, the analysis of speech acts, and the relation between logic and natural language.

**[341 Ethical Theory** Not offered 1983–84 ]

**342 Law, Society, and Morality (also Law 666)** Spring. 4 credits.

M W F 2:30. J. Bennett.  
An introduction to legal philosophy, concentrating on the nature of law. Law has been conceived as divine command, as command of an earthly sovereign, as exercise of power by the state, as rule-governed social behavior, and as the process of discovering the moral relations between citizens. The course looks at these views as expressed in the writings of Thomas Aquinas, Jeremy Bentham, John Austin, John Gray, Oliver Wendall Holmes, H. L. A. Hart, and Ronald Dworkin.

**361 Metaphysics and Epistemology** Fall. 4 credits.

M W F 10:10. H. Hodes.  
Topic for 1983–84: A discussion of problems concerning universals, abstract objects, substances, quantities, and minds.

**[363 Topics in the Philosophy of Religion** Not offered 1983–84.]

**381 Philosophy of Science** Spring. 4 credits.

W 7–9:30 p.m. 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, 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 modern philosophers such as Locke, Hume, and Descartes.

**[382 Philosophy and Psychology** Not offered 1983–84 ]

**[383 Philosophy of Choice and Decision** Not offered 1983–84 ]

**[387 Philosophy of Mathematics** Not offered 1983–84 ]

**[388 Social Theory** Not offered 1983–84 ]

**390 Informal Study** Fall or spring. To be taken only in exceptional circumstances. Credit to be arranged. Must be arranged by the student with his or her adviser and the faculty member who has agreed to direct the study.  
Staff.

## Advanced Courses and Seminars

These courses are offered primarily for majors and graduate students.

**395 Majors Seminar** Spring. 4 credits. Limited to junior and senior philosophy majors.

R 2:30. R. Boyd.  
An examination of some contemporary discussions of three or four classical philosophical issues, for example, free will versus determinism, personal identity, the objectivity of moral claims, problems in the philosophy of language.

**[412 Medieval Philosophy** Not offered 1983–84 ]

**[413 Plato and Aristotle** Not offered 1983–84 ]

**[414 German Philosophy after Kant** Not offered 1983–84 ]

**[431 Deductive Logic** Not offered 1983–84 ]

**[433 Philosophy of Logic** Not offered 1983–84 ]

**436 Intensional Logic** Spring. 4 credits.  
Prerequisite: Philosophy 231 or equivalent.

M W F 1:25. R. Stalnaker.  
Formal semantics for, and philosophical applications of, various modal and intensional logic.

**[437 Problems in the Philosophy of Language** Not offered 1983–84.]

**441 Contemporary Ethical Theory** Fall. 4 credits.

M W F 2:30. N. Sturgeon.  
Topic for 1983–84: Moral realism and its critics.

**[442 Ethics and the Philosophy of Mind** Not offered 1983–84 ]

**[443 Topics in Aesthetics** Not offered 1983–84 ]

**[444 Contemporary Legal Theory (also Law 720)** Not offered 1983–84 ]

**446 Topics in Social and Political Philosophy** Spring. 4 credits.

T R 1. J. Bennett.  
Topic for 1983–84: Democracy.

**461 Metaphysics** Spring. 4 credits.

M W 3:45. C. Hughes.  
Topic for 1983–84: Philosophy of Christianity.

**462 Theory of Knowledge** Fall. 4 credits.

T R 1. S. Shoemaker.

Topic for 1983–84: The Self. An examination of philosophical problems about self-consciousness, self-reference, and the nature of mind.

**[481 Problems in the Philosophy of Science** Not offered 1983–84 ]**490 Special Studies in Philosophy** Fall or spring. 4 credits each term. Open only to honors students in their senior year. Staff.**611 Ancient Philosophy** Fall. 4 credits.

M 3:45–5:40. T. Irwin.

Topic for 1983–84: Aristotle and Stoicism. Topics include categories; language and ontology; natural law and teleology; causation and free will; mind and body; morality and happiness.

**[612 Medieval Philosophy** Not offered 1983–84 ]**[613 Modern Philosophers** Not offered 1983–84 ]**[619 History of Philosophy** Not offered 1983–84.]**[631 Logic** Not offered 1983–84 ]**633 Philosophy of Language** Spring. 4 credits.

R 3:45–5:40. H. Hodes.

This seminar will be on various contemporary approaches to the theory of linguistic meaning. Topics will probably include semantic paradoxes; Tarski's definition of truth; Davidson's program for basing a theory of meaning on a theory of truth; the Fregean notion of sense; Dummett's criticism of realist semantic theories; Fodor's language-of-thought hypothesis. The nature of propositional attitudes and the semantics of attitude ascriptions. Readings will be mostly from the recent literature. Background in the philosophy of language will be useful but not required.

**641 Ethics and Value Theory** Spring. 4 credits.

T 3:45–5:40. D. Lyons.

Topic for 1983–84: Utilitarianism.

**[661 Theory of Knowledge** Not offered 1983–84 ]**662 Philosophy of Mind** Fall. 4 credits.

R 3:45–5:40. C. Ginet.

Topic for 1983–84: Action theory.

**[664 Metaphysics** Not offered 1983–84 ]**[665 Metaphysics** Not offered 1983–84 ]**[681 Philosophy of Science** Not offered 1983–84.]**[682 Philosophy of Social Science** Not offered 1983–84.]**700 Informal Study** Fall or spring. Credit to be arranged. 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. Staff.**Related Courses in Other Departments****[Chinese Philosophical Literature (Asian Studies 371)** Not offered 1983–84 ]**The Aristotelian Tradition in the Early and High Middle Ages (Society for the Humanities 417)**

Fall.

J. Murdoch.

**The Aristotelian Tradition in the Latter Middle Ages (Society for the Humanities 418)**

Spring

J. Murdoch.

**Grammar in the Middle Ages (Society for the Humanities 420)**

Spring

C. Brousseau.

**The Rhetoric of Justice (Society for the Humanities 427–428)**

Fall or spring.

J. Koffler.

**Physics**

D. F. Holcomb, chairman and director of undergraduate studies (109 Clark Hall, 256-7561); V. Ambegaokar, N. W. Ashcroft, K. Berkelman, H. A. Bethe (emeritus), D. G. Cassel, G. V. Chester, B. Cooper, R. M. Cotts, J. W. DeWire, M. J. Feigenbaum, M. E. Fisher, D. B. Fitchen, C. P. Franck, R. Galik, M. Gilchriese, B. Gittelman, K. Gottfried, S. Gregory, K. Greisen, L. N. Hand, D. L. Hartill, W. Ho, T. Kinoshita, J. A. Krumhansl, D. M. Lee, G. P. Lepage, R. M. Littauer, B. D. McDaniel, N. D. Mermin, J. Orear, R. O. Pohl, J. D. Reppy, R. C. Richardson, E. E. Salpeter, R. H. Siemann, A. J. Sievers, E. Siggia, R. H. Silsbee, A. Silverman, P. C. Stein, R. M. Talman, S. A. Teukolsky, M. Tigner, J. W. Wilkins, K. G. Wilson, 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 200 through 206, and 209. 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) is recommended for physics majors and engineers.

Courses beyond the introductory level that might be of interest to nonmajors are 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**

Various options permit the student to concentrate heavily on physics or to take less physics and pursue an accompanying constellation of courses in a related area. Those desiring a physics concentration as preparation for professional or graduate work should complete Physics 112–213–214 or 112–

217–218, and if possible, 315 by the end of the sophomore year. A basic preparation for a less intensive physics program may include Physics 112–213–214 or 207–208. In either case, it is necessary to complete a concurrent sequence of mathematics courses.

Mathematics 191–192–293–294 are usually recommended, except for students especially interested in continuing the study of mathematics, for whom Mathematics 111–112–221–222 (or equivalent) may be preferred.

Prospective majors are urged to make an early appointment at the physics office for advice in planning their programs. Acceptance into the major is normally granted after completion of a year of physics and mathematics at a satisfactory level; the student should propose a tentative plan for completing his or her graduation requirements as well as those for the major. The plan may change from time to time, but it must be approved by the major adviser. The major requirements have two components—a core and concentration.

Core requirements for the major include:

- 1) Physics 112–213–214 or 112–217–218 or 207–208.
- 2) an intermediate physics course in each of four areas: (a) mechanics—Physics 318 or 431, (b) electricity and magnetism—Physics 325 or 432, (c) modern physics—Physics 315 or 443, and (d) laboratory physics—Physics 310 (when not taken as substitute for laboratory work in 214 or 218), 330, 360, or 410.

Mathematics courses prerequisite for these physics courses are also necessary. The choice of core is influenced by the intended concentration. For a concentration in physics, Physics 112–217–218 (or 112–213–214), 315, 318, 325, and any 300-level laboratory course is appropriate, while for concentrations outside physics, part (2) of the core might consist of, for example, Physics 315, 360, 431, 432.

The concentration reflects the student's interest in some area related to physics; the array of courses must have internal coherence and be approved by the major adviser. The concentration must include at least 15 credits, with at least 8 credits in courses numbered above 300. Students have chosen to concentrate in such topics as physics, biophysics, chemical physics, astrophysics; geophysics; natural sciences; history and philosophy of science; computational physics; or physics with economics or business. A combined biology-chemistry concentration is recommended for premedical students or those who wish to prepare for work in biophysics. The concentration in natural science is particularly appropriate for teacher preparation.

The concentration in physics is recommended as preparation for professional or graduate work in physics or a closely related discipline. Twelve of the 15 concentration credits must be selected from physics courses numbered above 300 (in addition to those selected for part (2) of the core); the program must include Physics 410. The following courses are strongly recommended: Physics 443; Mathematics 421, 422, and 423; and at least one of Physics 341, 444, 454, Applied and Engineering Physics 401, Astronomy 431–432, or Geological Sciences 485.

**Foreign language requirement.** Students interested in eventual graduate work in physics are advised to meet this requirement with 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.

**Distribution Requirement**

The requirement in physical sciences is met by any two sequential courses such as Physics 101–102 or 207–208 or by any two general-education courses from the group 200–206, 209.

## 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 instructors in the course. In many cases an appropriate individual program can be worked out without exact adherence to the stated prerequisites.

## Courses

**101–102 General Physics** 101, fall, except by special permission; 102, spring (may also be offered during summer session). 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 or 112–213–214, but more mathematics than Physics 200 to 205. (Students planning to major in a physical science should elect Physics 207–208 or 112–213–214.) A self-paced, mastery-oriented autotutorial format; students work in a learning center at hours of their own choice. Repeated tests on each unit are given until mastery is demonstrated.

One large orientation meeting on R Sept. 1, or T Jan. 24, 7:30 p.m. Staff.  
Basic principles treated quantitatively but without calculus. Major topics for 101: Particle structure of matter; kinematics; forces and fields (including electric fields); momentum, angular momentum, energy (including nuclear energy); relativity; sound waves. 102: Electricity and magnetism; optics; thermal physics; quantum physics. Laboratory emphasizes instrumentation, measurement and interpretation of data. Text: *Physics for College Students—with Applications to the Life Sciences*, by Tilly and Thumm.

**112 Physics I: Mechanics and Heat** Fall or spring (may also be offered during summer session). 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 193 or 113).

Lecs, M W F 10:10 or 12:20; 2 recs each week; one 2-hour lab alternate weeks. Evening exams: fall, Oct. 13, Nov. 29; spring, Mar. 1, Apr. 5. Fall, D. Fitch; spring, R. Littauer.

Mechanics of particles: kinematics, dynamics, special relativity, 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*, 2nd edition, extended, by Halliday and Resnick.

**201–202 Energy: An Introduction to Physics**

201, fall; 202, spring. 3 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, M W F 2:30; disc, T 12:20 or T 2:30. Fall, R. Richardson; spring, staff.

The concept of energy and the principles that govern the conversion of one form of energy into another (the first and second laws of thermodynamics) are among the most fundamental and fruitful organizing principles in all of science. This course tracks this concept through a variety of areas of physics. Insights into the nature of scientific theories and applications to practical issues are both addressed. Emphasis is directed toward developing quantitative reasoning skills as well as knowledgeability about the subject matter. Text: *Romer, Energy, an Introduction to Physics*.

**203 The Physics of Space Exploration** 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 3:30. E. Salpeter.  
The principles of physics (plus simple mathematics) are applied to gain knowledge about planets, stars, and galaxies. The physics behind space probes (and their limitations) is discussed. Interpretation of data from astronomical observations is described. The level of the course will be that of a typical article in *Scientific American* and of Pasachoff's *Astronomy Now*.

**204 Physics of Musical Sound** 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. R. Silsbee.  
Many features of the production, propagation, and perception of sound may be understood in terms of important concepts in physics. These ideas, such as simple harmonic motion, wave propagation, analysis of complex signals as the sum of simple ones, energy propagation, and normal modes and resonance, are developed, drawing extensively for illustration from examples in musical acoustics. Topics covered will include the mechanism of tone production in musical instruments, the distinctions in tone quality among different instruments, the influence of concert-hall design upon what we hear, and some aspects of the mechanism of hearing.

**[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. Not offered 1983–84.

Lecs, M W F 2:30; disc to be arranged. V. Ambegaokar.

An attempt to explain how and when natural scientists can cope rationally with chance.]

**206 War and Peace in the Nuclear Age** 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 12:20–1:35; 1 rec each week. P. Stein.  
This course is intended for any student who wishes 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 and current issues in nuclear arms-control negotiations. Additionally, the course will examine critically the important concepts involved in military strategy and arms control. Attention will also be given to the moral and ethical questions involved. Physics 206 has the same lectures as Government 384 but a separate recitation section. Assignments emphasize development of quantitative reasoning skills as well as knowledgeability about technical aspects of the subject matter.

**207–208 Fundamentals of Physics** 207, fall; 208, spring. 4 credits each term. Prerequisites for Physics 207: high school physics plus coregistration in Mathematics 192 or 112, or substantial previous contact with introductory calculus, combined with coregistration in Math 193 or 113. Prerequisites for Physics 208: Physics 207 (or 112 or 101) and at least coregistration in Mathematics 192 or 112. Physics 207–208 is intended as a two-semester introduction for students majoring in a physical science, mathematics, or an analytically oriented biological science.

Lecs, M W 9:05 or 11:15; 2 recs each week; one 3-hour lab alternate weeks. Evening exams: fall, Oct. 13, Nov. 17; spring, Mar. 1, Apr. 5. Fall, R. Cotts; spring, R. Pohl.

Core-plus-branch plan. The first nine weeks of each semester are devoted to core material (lec/discussion/lab format): 207, mechanics and waves; 208, electromagnetic fields and circuits. For the last five weeks each term, each student selects one branch topic, and the work on this topic is done on a self-paced, tutored basis. Possible branches: 207, thermodynamics, acoustics and the physics of music, special relativity, gravitation; 208, optics, introduction to quantum mechanics, nuclear physics, electronics. Core at the level of *Physics*, by P. A. Tipler.

**209 The Quantum World** Fall. 3 credits. Intended for nonscientists; does not serve as a prerequisite to further science courses. Assumes no background beyond the ability to use high school algebra and trigonometry.

Lecs, M W F 2:30; disc, T 2:30. N. D. Mermin.  
The quantum theory explains the behavior of matter at the atomic and the subatomic levels and therefore underlies the behavior of all matter. It is a theory of extraordinary power, scope, and precision that has given rise to vast areas of modern technology. Yet the quantum theory is fundamentally mysterious, being based on a view of reality quite unlike anything that has ever before been imagined, which still strikes many thoughtful people as beyond the power of the human imagination fully to grasp. This course will attempt to convey some of the triumphs and profound mysteries of the quantum theory to students with no background or professional interest in science. Prerequisites: (a) the ability to enjoy being perplexed by genuinely perplexing ideas; (b) the ability not to be perplexed by high school algebra.

**213 Physics II: Electricity and Magnetism** Fall or spring (may also be offered during summer session). 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-hour lab alternate weeks. Evening exams: fall, Oct. 6, Nov. 1, Nov. 22; spring, Feb. 21, Mar. 15, Apr. 12. Fall, J. Orear; spring, M. Isaacson.

Electrostatics, behavior of matter in electric fields, magnetic fields, Faraday's law, electromagnetic oscillations and waves, magnetism. At the level of *Fundamentals of Physics*, by Halliday and Resnick. Laboratory covers electrical measurements, DC and AC circuits, resonance phenomena.

**214 Physics III: Optics, Waves, and Particles**

Fall or spring (may also be offered during summer session). 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, and credit for 214 is reduced to 3 credits.)

Lecs, T R 9:05 or 11:15; 2 recs each week; one 3-hour lab alternate weeks. Evening exams: fall, Oct. 6, Nov. 1, Nov. 22; spring, Feb. 21, Mar. 15, Apr. 12. Fall, K. Berkelman; spring, R. Galik.

Physics of wave phenomena, electromagnetic waves, interference and diffraction effects, optics, wave properties of particles, introduction to quantum physics.

**217 Physics II: Electricity and Magnetism** Fall or spring. 4 credits. Intended for students who have done very well in Physics 112 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, T R S 11:15; rec, T 2:30 with lab, W 1:30–4:30; or rec, T 3:35 with lab, R 1:30–4:30. Evening exams may be scheduled. Fall, R. Littauer; spring, D. Cassel.

A more rigorous version of Physics 213, at the level of *Electricity and Magnetism* by Purcell (Vol. 2, Berkeley Physics Series).

### 218 Physics III: Optics, Waves, and Particles

Fall or spring. 3 or 4 credits. A special section of Physics 214. Conditions governing enrollment are similar to those of Physics 217. Students are required to do the lab work offered in Physics 214 or to enroll concurrently in Physics 310 (in which case credit for Physics 218 is reduced to 3 credits).

Lecs, T R S 11:15; sec, T 2:30; lab, see Physics 214 or 310. Evening exams may be scheduled.

Fall, S. Gregory; spring, staff.

A more rigorous version of Physics 214.

### 310 Intermediate Experimental Physics

Fall or spring. 3 credits. Prerequisite: Physics 208 or 213. May be taken concurrently with Physics 214 or 218 in place of the lab work offered in Physics 214, with permission of student's adviser.

Labs, R F 1:25–4:25. Staff.

Students select from a variety of experiments. An individual, independent approach is encouraged. Facilities of the Physics 410 lab are available for some experiments.

### 315 Phenomena of Microphysics

Fall or spring. 3 credits. Primarily for students of engineering and prospective majors in physics. Prerequisites: Physics 214 and Mathematics 294.

Fall: lec, M W F 9:05; spring: T R S 11:15. Fall,

A. Silverman; spring, M. Feigenbaum.

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.

### 318 Analytical Mechanics

Spring. 4 credits. Prerequisites: Physics 208 or 214 plus one of 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 11:15–1:15, W F 11:15. N. D. Mermin. Newtonian mechanics of particles and systems of particles, including rigid bodies; oscillating systems; gravitation and planetary motion; moving coordinate systems, relativistic kinematics; wave propagation; Euler's equations; Lagrange's equations; Hamilton's equations; normal modes and small vibrations. At the level of *Classical Dynamics* by Marion.

### 325 Electricity and Magnetism

Fall. 4 credits. Prerequisites: Physics 214 plus coregistration in one of 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, T R S 11:15, T 3:35. J. Wilkins.

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, magnetic materials, field energy. Maxwell's equations, special relativity. At the level of *Introduction to Electrodynamics*, by Griffiths.

### 326 Electromagnetic Waves and Physical Optics

Spring. 4 credits. Prerequisite: Physics 325.

Lecs, T R S 9:05, W 1:25. B. Gittelman.

Electrodynamics: applications of Maxwell's equations, wave equation, transmission lines, wave guides, radiation, special relativity. Physical optics: reflection, refraction, dispersion, polarization, Fresnel and Fraunhofer diffraction. At the level of *Classical Electromagnetic Radiation* by Marion.

### 330 Modern Experimental Optics

Spring. 4 credits. Prerequisite: Physics 214 or equivalent.

Lec, M 2:30; lab, T R 1:25–4:15 or W F 1:25–4:15. L. Hand.

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.

### 341 Thermodynamics and Statistical Physics

Fall. 4 credits. Prerequisites: Physics 214 and Mathematics 294.

Lecs, M W F 10:10, T 2:30. J. Krumhansl.

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.

### 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.

Fall, W. Ho; spring, staff.

An experimental survey of some devices and circuits in two general areas: analog and digital electronics. In analog circuits, the major emphasis is on operational amplifiers and their applications. Discrete devices (diodes, bipolar transistors, and field-effect transistors) are covered briefly. In digital circuits, some time is spent on combinatorial logic devices. This experience is then applied to problems in programming and interfacing a simple microcomputer.

### 400 Informal Advanced Laboratory

Fall or spring; (may also be offered during summer session). Variable credit. Prerequisite: two years of physics and permission of instructor.

Lab, 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.

### 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.

R. Siemann 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.

### 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. 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, R. Talman; spring, D. Yennie.

431: Mechanics. Includes Newtonian mechanics, Lagrange's and Hamilton's equations, central forces, rigid-body motion, and small oscillations. At the level of *Mechanics*, by Symon. 432: Electricity and magnetism. Includes electrostatics, magnetostatics, boundary value problems, dielectric and magnetic media. Maxwell's equations and electromagnetic waves. At the level of *Introduction to Electrodynamics*, by Griffiths.

### 443 Introductory Quantum Mechanics

Fall. 4 credits. Prerequisites: Physics 318 and 325, or 431–432; Physics 315 and Mathematics 421; or permission of instructor.

Lecs, M W F 9:05, M 1:25. D. M. Lee. Introduction to concepts and techniques of quantum mechanics, at the level of *Quantum Mechanics*, by Cohen-Tannoudji, Diu, and Laloe.

### 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. M. Gilchriese. Behavior of high-energy particles and radiation; elementary particles; basic properties of nuclei; nuclear reactions; nuclear forces; cosmic rays; general symmetries and conservation laws. At the level of *Subatomic Physics*, by Frauenfelder and Henley.

### 454 Introductory Solid-State Physics

Spring. 4 credits. Prerequisite: Physics 443 or Chemistry 793, or permission of instructor.

Lecs, T R S 10:10, 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, magnetic properties, and superconductivity. At the level of *Introduction to Solid State Physics*, fifth edition, by C. Kittel.

### 481–489 Special Topics Seminar

Spring. 2 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.

### 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.

### 500 Informal Graduate Laboratory

Fall or spring. Variable credit.

### 506 Design of Electronic Circuitry

Spring. 3 credits.

M W 9:05. D. Hartill.

Circuit techniques and design in electronic measurement and instrumentation, with emphasis on applications to physics experiments. At the level of *Integrated Electronics*, by Millman and Halkias.

### 510 Advanced Experimental Physics

Fall or spring. 3 credits.

Labs, T W 1:25–4:25. R. Siemann 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.

**520 Projects in Experimental Physics** Fall or spring. 1–3 credits. To be supervised by faculty member. Students must advise department coordinator of faculty member responsible for their grade. 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.

**551 Classical Mechanics** Fall. 3 credits. Prerequisites: A good knowledge of mechanics at the level of the books by K. Symon or J. B. Marion and familiarity with modern mathematics at the level of Mathematics 515–516.

Lecs, T R 10:10, R 2:30. E. Siggia. Classical mechanics, with an introduction to dynamical systems, at the level of V.I. Arnold's text, *Mathematical Methods of Classical Mechanics*. In addition to the standard treatments of Lagrangian methods and rotating systems, periodically forced systems are treated by means of period-1 maps. The various interpretations of Hamilton-Jacobi are integrated with general methods for solving partial differential equations by characteristics. The notions of integrability, ergodicity, and mixing will be covered. Some discussion of averaging and Kolmogorov-Arnold-Moser theory conclude the course. The necessary mathematics of manifolds and differential forms is developed in the course.

**[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. Offered alternate years. Not offered 1983–84.

Fall: lec, T R 1:25–2:40. Spring: lec, T R.]

**561 Classical Electrodynamics** Fall. 3 credits.

Lecs, M W F 9:05. M. Feigenbaum. Maxwell's equations, electromagnetic potentials, electrodynamics of continuous media (selected topics), special relativity, radiation theory. At the level of *Classical Electrodynamics*, by Jackson.

**562 Statistical Mechanics (also Chemistry 796)**

Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 793 or equivalent.

Lecs, T R 8:30–9:55. B. Widom. Thermodynamic assemblies; Legendre transformation. Ergodic and information theory ideas. Ensembles and partition functions; equivalences and fluctuations; indistinguishability. Thermodynamic properties of ideal gases and crystals; Third Law; chemical equilibria. Imperfect gases; correlation functions and their applications. Ideal quantum gases; Bose-Einstein condensation. Ideal paramagnets. Ising models and lattice gases. At the level of Kubo's *Statistical Mechanics*.

**572 Quantum Mechanics I** Fall or spring. 4 credits.

Lecs, M W F 11:15. Fall; T-M. Yan; spring, K. Wilson. 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 Schrödinger equation is assumed, including its application to simple systems such as the hydrogen atom.

**574 Quantum Mechanics II** Spring. 4 credits. Required of all Ph.D. majors in theoretical physics. Lec, M W F 11:15. P. Lepage.

Discussion of various applications of quantum mechanics, such as collision theory, theory of spectra of atoms and molecules, theory of solids, emission of radiation, relativistic quantum mechanics. At the level of *Intermediate Quantum Mechanics*, by Bethe and Jackiw.

**[612 Experimental Atomic and Solid-State Physics]**

Fall. 3 credits. Not offered 1983–84. Lectures on techniques and design principles. Examples of topics are signal detection and processing, low-temperature techniques and devices, correlation and Fourier transform spectroscopy.]

**614 Experimental High-Energy Physics** Spring. 3 credits.

Lecs to be arranged. Staff. Design principles of high-energy apparatus, including beam transport and detection systems, with examples of their applications. Practice in use of relativistic kinematics. Statistical analysis in design and interpretation of experiments.

**625 Physics of Black Holes, White Dwarfs, and Neutron Stars (also Astronomy 511, High-Energy Astrophysics)** Spring. 3 credits.

Lecs, T R 10:10–11:35. S. Teukolsky. 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.

**635 Solid-State Physics I** Fall. 3 credits. First semester of a two-semester sequence of solid-state physics for graduate students who have had the equivalent of Physics 572 and 562 and some prior exposure to solid-state physics, such as Physics 454.

Lecs, T R 11:15–12:40. A. Sievers. Electronic and phonon properties of metals and insulators, including transport processes. Discussions at the level of *Solid State Physics*, by N. W. Ashcroft and N. D. Mermin.

**636 Solid-State Physics II** Spring. 3 credits.

Lecs, M W F 10:10. J. Wilkins. Concepts developed in Physics 635 are extended and applied in a survey of the following: equilibrium and transport properties of real materials, localized states, magnetism, neutron and light scattering, phenomenological superconductivity, and other topics of current interest in condensed-matter physics.

**645 High-Energy Particle Physics** Fall. 3 credits.

Lecs, M W F 11:15. D. Cassel. Introduction to the physics of nucleons and mesons. 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.

**646 High-Energy Particle Physics** Spring. 3 credits.

Lecs, T R 11:15–12:45, T 2:30. K. Berkelman. Topics of current interest, including hadron electroproduction, electron positron annihilation, and high-energy neutrino 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.

**651 Advanced Quantum Mechanics** Fall. 3 credits.

Lecs, M W F 10:10, T 2:30. D. Yennie. Relativistic quantum mechanics with emphasis on perturbation techniques. Extensive applications to quantum electrodynamics. Introduction to renormalization theory. At the level of *Relativistic Quantum Mechanics*, by Bjorken and Drell.

**652 Quantum Field Theory** Spring. 3 credits.

Lecs, M W F 11:15. T. Kinoshita. Canonical field theory. Analytic property of scattering amplitudes and dispersion relations. Renormalization and renormalization group. Symmetry and spontaneous symmetry breaking. Gauge theories. At the level of *Quantum Field Theory*, by Itzykson and Zuber.

**653 Statistical Physics** Fall. 3 credits. Normally taken by students in their second or later years. Prerequisites: competence in the basic principles of quantum mechanics, statistical mechanics, and thermodynamics.

Lecs, M W F 9:05. N. Ashcroft. Survey of topics in modern statistical physics, including the theory of simple classical and quantum fluids; the theory of ordered systems such as superfluids and superconductors; kinetic theory and the Boltzmann equation; phenomenological Fermi liquid theory and hydrodynamics; theories of inhomogeneous systems; scaling theories and phase transitions. The contents of the course vary with the current interests of the instructor. There is rarely any set text, though *Statistical Physics*, by Landau and Lifshitz, or *Statistical Mechanics*, by Huang, give an idea of the level.

**654 Theory of Many-Particle Systems** Spring. 3 credits. Prerequisites: Physics 562, 574, 635, 636, and 653.

Lecs, T R 10:10–11:35. Staff. Equilibrium and transport properties of microscopic systems of many particles studied at zero and finite temperatures. Thermodynamic Green's function techniques introduced and applied to such topics as normal and superconducting Fermi systems, superfluidity, magnetism, insulating crystals.

**661 High-Energy Phenomena** Fall. 3 credits.

Lecs, M W F 2:30. P. Lepage. Topics vary at the discretion of the instructor.

**[665 Topics in Theoretical Astrophysics (also Astronomy 555)]** Fall. 4 credits. Not offered 1983–84.

Lecs, M W F 2:30. E. Salpeter. Usually concentrates on the theory of the interstellar medium.]

**667 Theory of Stellar Structure and Evolution (also Astronomy 560)** Fall. 4 credits. Usually offered odd calendar years

Lecs, M W F 1:25. I. Wasserman. 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.

**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.

**690 Independent Study in Physics** Fall or spring. Variable credit.

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, Literatures, and Linguistics, p. 163.

## Psychology

D. Bem, S. Bem, K. Bock, U. Bronfenbrenner, W. Collins, J. Cutting, R. Darlington, T. DeVogd, H. M. Feinstein, B. L. Finlay, L. Fitzgerald, J. Freyd, E. J. Gibson, T. D. Gilovich, B. P. Halpern, D. Irwin, R. E. Johnston, F. Keil, K. Keil, C. Krumhansl, W. W. Lambert, H. Levin, D. Levitsky, J. B. Maas, R. D. Mack, L. Meltzer, D. T. Regan, E. Regan, T. A. Ryan, K. E. Weick. Visiting faculty: J. Cunningham, G. Jansson, D. Ricks

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 theories of personality, beliefs and attitudes, 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

Prerequisites for admission to the major are:

- 1) any three courses in psychology (students often begin with Psychology 101);
- 2) no grade below C+ in any psychology course; and
- 3) acceptance by the Majors and Advising Committee of the Department of Psychology.

Application forms may be obtained at the department office and should be filed two weeks before the pre-course enrollment period.

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 190, 205, 207, 209, 214, 215, 305, 307, 308, 309, 310, 313, 314, 316, 345, 411, 416, 436, or 464.
- 2) **Biopsychology:** Psychology 123, 322, 324, 326, 361, 396, 422, 425, 491. *Note:* Courses in the biopsychology area other than 123 all have 123 and/or introductory biology among their prerequisites.
- 3) **Social, personality, and abnormal psychology:** Psychology 206, 275, 277, 280, 284, 325, 327, 328, 379, 380, 381, 383, 384, 385, 402, 426, 467, 468, 469, 481, 482, 483, 486, 488, or 489.

The major adviser determines to which group, if any, the following courses may be applied.

- 4) **Other courses:** Psychology 101, 103, 201, 347, 350, 386, 410, 420, 440, 443, 451, 465, 470, 471, 472, 473, 475, 476, 477, 478, 479, 490, 494, 498, 499.

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 or Psychology 471.
- 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 352–353, Industrial and Labor Relations 210–311, and Sociology 325. An up-to-date list is posted outside of 278 Uris Hall. 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. Sample examination questions are posted outside of 278 Uris Hall.

**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 introductory 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, organic chemistry, 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 in the 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.

**Honors.** This program is intended to give students an opportunity to examine selected problems in depth and to carry out independent research under the direction of a faculty member. During the spring term of the junior year, an honors student will enroll in Psychology 494 and will develop a proposal and begin work on a research project. The student will arrange a meeting with an honors adviser and a faculty sponsor. At the end of the spring term, a report of the semester's work will be submitted for faculty review.

By the fall term of the senior year, honors students will have begun work in their final research projects. They will also enroll in a senior honors seminar, Psychology 498, in which research projects will be discussed. Thesis research will continue in the spring with enrollment in Psychology 499, Senior Honors Dissertation. Final honors standing is based on a written thesis and an oral defense of the thesis as well as on general academic performance.

Prospective applicants are advised to file applications early in the fall term of their junior year. Decisions on these applications will be made by the faculty at the end of the fall semester. It is possible for a student who has satisfactorily completed independent study or research to be admitted to the program at the end of the junior year. For consideration by the honors committee of the Department of Psychology, applicants must have a minimum cumulative grade average of at least B+ in all courses in psychology.

### Distribution Requirement

The distribution requirement in the social sciences is satisfied by any two courses in psychology with the exception of Psychology 123, 322, 324, 326, 350, 361, 396, 422, 425, 451, 471, 472, 473, 476, 477, 479, 491, and 693.

### Courses

**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. Maas.

The study of human behavior. Topics include brain functioning and mind control, psychophysiology of sleep and dreaming, psychological testing, perception, learning, 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.

**103 Introductory Psychology Seminars** Fall. 1 credit. Limited to 400 students. Prerequisites: concurrent enrollment in Psychology 101.

Hours to be arranged; 32 different time options. 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.

**123 Introduction to Psychology: Biopsychology** Fall. 3 credits. May not be taken for credit by students who are registered in or have completed one or more courses offered by the Section of Neurobiology and Behavior of the Division of

Biological Sciences, or two or more biopsychology courses.

**M W F 10:10.** E. Adkins Regan and staff.  
A survey of behavior emphasizing evolutionary and physiological approaches, designed to introduce students to the interface between biology and psychology. Both human and nonhuman behavior are included, together with theoretical issues pertaining to the application of biological principles to human behavior.

**190 Thought and Intelligence** Spring 4 credits.  
No prerequisites.

**M W F 9:05.** Staff.  
The concepts underlying the measurement of intelligence and the problems involved in interpreting such measurements are considered in the context of psychological studies of problem solving and thinking. Topics include introspective accounts of thought, experiments on problem solving and concept formation, cross-cultural studies of thinking, the history of the concept of intelligence, reliability and validity of tests, heritability of intelligence, and recent relevant research.

**[201 Introduction to Psychology as a Laboratory Science** Fall 3 credits. Prerequisite: one course in psychology (normally Psychology 101, 123, or 190). High school credit in psychology may meet this prerequisite with permission of instructor. Not offered 1983–84.  
Staff.]

**[205 Perception** Fall 3 credits. Limited to 50 students. Open to first-year students. Not offered 1983–84; next offered 1984–85.

**T R 12:20–2:15.** J. Cutting.  
Basic concepts and phenomena in the psychology of perception, with emphasis on stimulus variables and sensory mechanisms. All sensory modalities are considered; visual and auditory perception are discussed in detail.]

**[206 Psychology in Business and Industry (also Hotel Administration 314)** Spring 3 credits. Limited to 35 psychology students. Prerequisites: Psychology 101, 123, or 190, or permission of instructor. Not recommended for upperclass students in ILR. Not offered 1983–84.

**T 12:20, R 12:20–2.** Staff.  
The principles of psychology applied to industrial and business systems; personnel selection; placement and training; problems of people at work, including evaluation, motivation, efficiency, and fatigue; and the social psychology of the work organization.]

**[207 Motivation Theory: Contemporary Approaches and Applications** Spring 4 credits. Prerequisite: an introductory psychology course. Not offered 1983–84.

**M W F 11:15.** Staff.  
Models and research in human motivation are examined and integrated. Traditional approaches are used as departure points for the study of more current themes, such as intrinsic motivation and achievement motivation. Attention is given to how pertinent various themes are to real-life behavioral settings.]

**209 Developmental Psychology** Spring 4 credits. Prerequisite: an introductory psychology course.

**T R 12:20–1:45;** sec to be arranged. F. Keil.  
A comprehensive introduction to current thinking and research in developmental psychology. Topics include perceptual and cognitive development in infancy and childhood, attachment, language development, Piagetian theory and research, moral development, cross-cultural perspectives, and socialization.

**214 Introduction to Cognitive Psychology** Spring 3 credits. Prerequisite: one course in psychology.

**T R 12:20–1:35.** K. Bock.  
An introduction to psychology, emphasizing the perceptual and cognitive processes that underlie

human behavior. The course is designed to introduce the student to topics such as perception, memory, language, thinking, development, problem solving, and decision making. Techniques for investigating problems in these areas are discussed.

**215 Language and Communication** Spring 3 or 4 credits; the 4-credit option involves a term paper or project. Limited to 40 students. Open to first-year students.

**M W F 1:25.** J. Freyd.  
Topics include the nature of language, its origin and acquisition, the relation between language structures and psychological processes; also animal communication, sign language, aphasia, black English, and reading.

**[275 Introduction to Personality Psychology** Fall 3 or 4 credits; the additional (or fourth) credit is given for attendance at the optional section meeting, and a term paper. Prerequisite: an introductory psychology course.

**T R 10:10–11:30;** sec to be arranged. Staff.  
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.]

**[277 Psychology of Sex Roles (also Women's Studies 277 and Sociology 277)** Spring 3 or 4 credits; the additional (or fourth) credit is given for an optional term paper. Prerequisite: an introductory psychology course. Not offered 1983–84; next offered 1984–85.

**T R 2:30–4.** S. Bem.  
The course addresses the question of why and how adult women and men come to differ in their overall life styles, work and family roles, personality patterns, cognitive abilities, etc. This broad question is examined from five perspectives: (a) the psychoanalytic perspective, (b) the biological perspective, (c) the historical and cultural evolutionary perspective, (d) the child development perspective, and (e) the social-psychological and contemporaneous perspective. Each of these perspectives is also brought to bear on more specialized phenomena relating to the psychology of sex roles, including psychological androgyny, women's conflict over achievement, the male sex role, egalitarian marriage relationships, gender-liberated child-rearing, female sexuality, homosexuality, and transsexualism.]

**280 Introduction to Social Psychology (also Sociology 280)** Spring 3 or 4 credits; the additional (or fourth) credit is given for attendance at the optional section meeting, and a term paper. Prerequisite: an introductory psychology course.

**T R 10:10–11:25.** T. Gilovich.  
An introduction to research and theory in social psychology. Topics include human processing of social information; social influence, persuasion, and attitude change; social interaction and group phenomena. The application of social psychological knowledge to current social problems will also be discussed.

**[284 Social-Psychological Theories and Applications (also Sociology 284)** Fall 3 credits. Not offered 1983–84.

**T R 8:40–9:55.** Staff.  
Emphasis is given to those aspects of personality and social psychology which have led to effective practical applications or which provide reasonable insights into the genesis and/or amelioration of social and personal problems.]

**[305 Visual Perception** Spring 3 or 4 credits, depending on whether the student elects to do an independent laboratory project. Prerequisite: Psychology 205 or permission of instructor. Not offered 1983–84; next offered 1984–85.

**T R 10:10.** C. Krumhansl.

A detailed examination of theories and processes in visual perception. Topics will include the perception of color, space, and motion; perceptual constancies; adaptation; pattern perception; and aspects of perceptual learning and development.]

**307 Chemosensory Perception** Fall 3 or 4 credits; the optional (or fourth) credit is for an independent laboratory project.

**T R 9:05.** B. P. Halpern.  
An examination of basic theory, data, and processes for perception of the chemosensory environment. Students will read, analyze, and discuss difficult original literature in the areas covered. Topics include psychophysical methods for human and nonhuman studies, stimulus control, chemosensory function and development in neonates, role of chemosensory function in food choices, chemosensory communication, effects of pollution of the chemosensory environment, possible consequences of chemosensory dysfunctions, and use of chemosensory systems as neural models.

**[308 Perceptual Learning** Fall 3 credits. Prerequisite: Psychology 205, 209, 305, or permission of instructor. Not offered 1983–84.]

**309 Development of Perception and Attention** Fall 3 credits. Prerequisite: Psychology 205, 209, 214, 305, or permission of instructor.

**M W F 10:10.** J. Freyd.  
An ecological view of perceptual development: development of perception of objects, events, the spatial layout, pictures, and symbols. The level of the course is that of E. J. Gibson, *Perceptual Learning and Development*.

**310 The Psychology of Reading** Spring 4 credits. Prerequisite: an introductory psychology course or permission of instructor; a course in cognitive psychology is recommended.  
Hours to be announced. J. Freyd.  
The course will introduce the major areas of psychological investigation on cognitive processes used in reading. Topics to be covered included the role of eye movements, printed and handwritten letter perception and theories of pattern recognition, alphabets and other writing systems, word perception, context effects in letter and word recognition, psycholinguistic concepts applied to reading, the role of speech in reading, sentence comprehension, spelling, learning to read, dyslexia and other reading disabilities, speed-reading, and text understanding.

**313 Perceptual and Cognitive Processes** Fall 3 credits. Prerequisite: Psychology 205 or 214, or permission of instructor.

**M W F 9:05.** D. Irwin.  
Survey of research and theory in the area of perceptual and higher mental processes. Emphasis is on the human as an information processing system. Topics include visual information processing, pattern recognition, cognition, memory, and artificial intelligence.

**314 The Social Psychology of Language** Spring 4 credits. Prerequisite: a course in linguistics or psycholinguistics and in social or personality psychology, or permission of instructor.

**T R 2:30–4:25.** H. Levin.  
We are aware that one talks differently to children than to adults, to foreigners than to native speakers, to people we like than to those we detest, to people whose intelligence we respect compared to those we think are idiots. Speech varies by social setting, by the relationships between people, by formality, by friendship, by affection, and by the purposes of the communication: deception, persuasion, propaganda, etc. What are the rules of social language? How do we acquire the abilities to vary language appropriately and to understand the meanings of such variations? We will attend not only to what is said but to the style of the language: for example, to paralinguistic (e.g., intonation, hesitations, etc.) and to the structure (grammar and semantics) of speech.

**[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). Not offered 1983–84.

Lecs, T R 2:30–4:25; lab, hours to be arranged. Staff.

Basic approaches to the perception of auditory information, with special consideration of complex patterns such as speech, music, and environmental sounds.]

**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. 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. Prerequisite: one year of introductory biology plus a course in psychology or Biological Sciences 221 or 222. S-U grades optional.

T R 10:10–11:30. E. Regan, T. DeVogd.

The relationship between endocrine and neuroendocrine systems and the behavior of animals, including humans. Major emphasis is on sexual, parental, and aggressive behavior.

**324 Biopsychology Laboratory (also Biological Sciences 324)** Fall. 3 credits. Limited to 25 juniors and seniors. Prerequisite: Psychology 201 or Biological Sciences 103–104, or Psychology 123 or Biological Sciences 221 or 222, and permission of instructor. S-U grades optional.

T R 1:25–4:25. T. DeVogd.

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.

**325 Introductory Psychopathology** Fall. 3 or 4 credits; the 3-credit option entails lectures, readings, and two exams; the 4-credit option requires an additional seminar-recitation meeting and a term paper. Prerequisite: a course in introductory psychology. May be taken concurrently with Psychology 327 (for 3 credits in 325 and 2 credits in 327) with permission of instructor. Enrollment in Psychology 327 is limited.

T R 2:30–4:25. R. Mack.

A survey of the various forms of psychopathology, child and adult, 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.

**326 Evolution of Human Behavior** Fall. 4 credits. Prerequisite: Psychology 123, an introductory biology or anthropology course, or permission of instructor.

T R 2:30–4:25. R. Johnston.

A broad comparative approach to behavior in animals, with special emphasis on human evolution and the evolution of human behavior. Topic areas may include courtship and mating systems, aggression and territoriality, communication, and language. Sociobiological theories of human nature and evolution will be discussed and evaluated.

**327 Fieldwork in Psychopathology and the Helping Relationship** Fall. 2 credits. Prerequisite: Psychology 325 or concurrent registration in 325 and permission of instructor. Students do not enroll in advance for this course. Field placement assignments are made in Psychology 325 during the first two weeks of the semester. Students who have already taken Psychology 325 must contact the instructor during the first week of the semester. Enrollment is limited by the fieldwork placements available. Fee \$15.

Hours to be arranged. R. Mack.

An introductory fieldwork course for students currently enrolled in, or who have taken, Psychology 325. In addition to fieldwork, weekly supervisory-seminar meetings are held to discuss fieldwork issues and assigned readings.

**328 Continuing Fieldwork in Psychopathology and the Helping Relationship** Fall or spring.

2 credits each term. Prerequisite: Psychology 325, 327, and permission of instructor. S-U grades only. May not be taken more than twice. Students do not enroll in advance for this course. Students in Psychology 327 should inform their teaching assistant before the end of the semester of their desire to take Psychology 328. Students not currently in a field placement who want to take Psychology 328 should contact the instructor during the first week of the semester. Field placement assignments will be made during the first two weeks of the semester. Enrollment is limited by the fieldwork placements available. Fee \$15.

Fieldwork and supervisory times to be arranged. R. Mack and staff.

Designed to allow students who have begun fieldwork as part of Psychology 327 to continue their field placements under supervision and for academic credit. A limited number of students may be allowed to begin their fieldwork with Psychology 328 but only with permission of the instructor.

**345 Psychological Research and Afro-Americans (also Africana Studies 345)** Spring. 4 credits.

Prerequisite: one course in introductory psychology or Africana Studies and Research Center 171.

M W F 11:15. L. Fitzgerald.

In this course we will examine psychological issues that have implications for Afro-Americans. The emphasis of the research topics to be covered will be on the following themes: (1) the assessment of intelligence and personality, (2) cognitive and motivational factors in stereotype and racism, (3) the social and psychological implications of stigmatization. Course requirements include student participation in discussion, an in-class presentation, a midterm paper, and a final group project.

**347 Psychology of Visual Communications**

Spring. 4 credits. Limited to 12 students.

Prerequisite: Psychology 101 and permission of instructor.

T 10:10–12:05; lab to be arranged. J. 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 nonprint media.

**350 Statistics and Research Design** Fall.

4 credits. Prerequisite: a course in the behavioral sciences.

M W F 10:10. T. Gilovich.

Acquaints the student with the elements of statistical description (measures of average, variation, correlation, etc.) and, more importantly, develops an understanding of statistical inference. Emphasis is placed on those statistical methods of principal relevance to psychology and related social sciences.

**361 Biochemistry and Human Behavior (also Nutritional Sciences 361)** Fall. 3 credits.

Prerequisites: Biological Sciences 101–102, Chemistry 103–104, Psychology 101, or permission of instructor.

M W F 11:15. D. Levitsky.

The course is intended to survey the scientific literature on the role of the brain and body biochemical changes as determinants of human behavior. The topics covered include action and effects of psychopharmacologic agents, biochemical determinants of mental retardation, biochemical theories of psychosis, effects of nutrition on behavior. A fundamental knowledge of human biology and chemistry is essential.

**379 Social Cognition** Fall. 4 credits. Prerequisite: one course in social or cognitive psychology, or permission of instructor.

T R 10:10–11:25. L. Fitzgerald.

The focus of this course is on experimental research that applies cognitive principles to the study of social psychological phenomena. With an orientation toward examining knowledge structures and cognitive processes underlying person perception and social judgment, the following themes are emphasized: (a) cognitive organization and representation of social information, (b) perceiving the causes of social behavior, and (c) assessing the adequacy of social information processing.

**380 Beliefs and Attitudes (also Sociology 380)**

Spring. 4 credits. Prerequisite: some familiarity with the topic of attitudes from prior courses, or permission of instructor.

M W F 1:25. L. Meltzer.

An intermediate course in social psychology. Attitudes are viewed as emotionally charged beliefs that underlie ideologies, values, interpersonal feelings, and religion. The seminar will analyze the historical roots and current status of three approaches to the systematic analysis of beliefs and attitudes: (1) the reasoned action theory of Fishbein and Ajzen; (2) the balance theory of Fritz Heider and its many derivatives; and (3) the functional theories in psychology (Daniel Katz), psychoanalysis (Freud and others), and cultural anthropology (Marvin Harris). Students will read original source material rather than textbooks.

**[381 Person Perception and Expression (also Sociology 381)]**

Spring. 4 credits. Prerequisite: one course in social psychology or personality, or one course in psychology and one course in sociology, or permission of instructor. Not offered 1983–84.

M W F 1:25. L. Meltzer.

An intermediate course in social psychology, focusing on people's judgments of one another and on their attempts to manipulate how others judge them. Impressions, attributions, biases, self-concept, self-disclosure, self-presentation, deception, body language, conversational style, and facial expressions are relevant topics.]

**383 Social Interaction (also Sociology 383)**

Spring. 4 credits. Prerequisite: a course in social psychology.

M W 2:30–4:25. D. Hayes.

Fine-grain analyses of social behavior: its structure, changes, and determinants. Extensive practice in analysis of filmed and taped interactions. Student research is required throughout the course.

**384 Cross-Cultural Psychology (also Sociology 384)**

Spring. 4 credits. Prerequisite: a course in psychology and one in either sociology or social or cultural anthropology, or permission of instructor.

M W F 11:15. W. W. Lambert.

A critical survey of approaches, methods, discoveries, and applications in emerging attempts to study human nature, experience, and behavior cross-culturally. Focus on studies of cognition, values, socialization, sociolinguistics, personality, attitudes, stereotype, ideology, sociocultural development, and mental illness. Problems of how one can learn another culture will also be dealt with.

**385 Theories of Personality (also Sociology 385)**

Fall. 4 credits. Prerequisite: Psychology 101, 214, or 275, or permission of instructor.

T R 1–2:15. W. W. Lambert.

An intermediate analysis of comparative features of the historically and currently important theories of personality, with an evaluation of their systematic empirical contribution to modern personality study, to psychology, and to other behavioral sciences.

**396 Introduction to Sensory Systems (also Biological Sciences 396)**

Spring. 3 or 4 credits (4 credits with discussion and term paper). No auditors. Prerequisite: 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. S-U grades optional for graduate students only.

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 that represent adaptations of animals to particular habitats or environments. The principles and limitations of major methods used to examine sensory systems will be considered. For spring 1984, general principles of sensory systems, and auditory, visual, and somesthetic systems will be 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 *Neurones without Impulses*, edited by Roberts and Bush, and *Recognition of Complex Acoustic Signals*, edited by Bullock.

#### 402 Current Research on Psychopathology

Fall. 4 credits. Prerequisite: Psychology 325.

T R 12:20–2:15; sec to be arranged. K. Keil. Current research and theory on the nature and etiology of schizophrenia, the affective disorders, and psychopathy. Approaches from various disciplines are considered. Minimal attention to psychotherapy.

#### 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.

#### 411 Memory and Human Nature

Fall. 4 credits. Limited to 20 students. Prerequisite: several courses in psychology or permission of instructor. Nonpsychology majors with backgrounds in literature or anthropology are encouraged to apply.

T R 2:30–4. Staff.

The human activity of remembering is considered from various perspectives: personal, developmental, experimental, cross-cultural, etc. The focus is on the natural and social context of memory; laboratory studies are considered when they help clarify ordinary remembering. Specific topics include memory for remote events and childhood; for controversial and unacceptable material; for stories and conversations and events; individual, developmental, and cultural differences in remembering and thinking; mnemonics and memorists. Class periods are devoted to seminar discussions.

#### 416 Psychology of Language

Fall. 4 credits. Prerequisite: Psychology 215 or permission of instructor.

T R 12:20–1:45. F. Keil.

An advanced treatment of the nature of the human capacity of language. Topics include the nature of linguistic theory, syntax and semantics, aspects of language use (comprehension, memory and knowledge, thought and action, communication), and language acquisition.

#### 420 Human Factors

Spring. 4 credits. Prerequisite: Psychology 205 or 313, or permission of instructor.

M W F 11:15. D. Irwin.

This course considers the application of basic psychological principles to the design and utilization of machines and work settings. Topics include the design of displays and controls, the effects of noise and fatigue on human performance, and the nature of person-computer interactions.

#### [422 Developmental Biopsychology

Spring. 4 credits. Prerequisites: a course in introductory biology and a course in biopsychology or

neurobiology (such as Psychology 123 or Biological Sciences 221). Not offered 1983–84; next offered 1984–85.

M W F 9:05. B. Finlay.

We will discuss the relationship of the development and evolution of the brain to the development of behavior. Topics include normal neuroembryology; 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.]

**[425 Brain and Behavior** Fall. 3 or 4 credits (4-credit option includes a discussion section and requires an additional paper). Prerequisite: a course in introductory biology and a course in biopsychology or neurobiology (such as Psychology 123 or Biological Sciences 221). Not offered 1983–84; next offered 1984–85.

M W F 9:05. B. Finlay.

We will study the relation between structure and function in the central nervous system. Human neuropsychology and the contribution of work in animal nervous systems to the understanding of the human nervous system will be stressed. Some topics to be discussed include visual and somatosensory perception, the organization of motor activity, emotion and motivation, psychosurgery, and memory and language.]

#### 426 Seminar and Practicum in Psychopathology

Spring. 4 credits. Limited to 16 students. Prerequisite: Psychology 325; permission of instructor required in all cases. Student should apply to the course during preregistration in fall semester; acceptance will be announced before the end of the fall semester.

T R 2:30–4:25; fieldwork to be arranged. R. Mack.

A seminar and fieldwork course for advanced students who have mastered the fundamental concepts of personality and psychopathology. An opportunity to explore in depth the various forms of psychopathology, etiology, and treatment; to discuss these in seminar; and to work with mental health professionals and those who seek their help. The course includes an experiential component that will be described when applying for the course.

#### [436 Language Development (also Human Development and Family Studies 436)

Spring. 3 or 4 credits. Prerequisite: at least one course in cognitive psychology, cognitive development, or linguistics. Offered in alternate years. Not offered 1983–84; next offered 1984–85.

T R 10:10–12:05. B. Lust.

A survey of basic literature in language development. Major theoretical positions in the field are considered in the light of studies in first-language acquisition of phonology, syntax, and semantics from infancy onward. The fundamental issue of relations between language and cognition will be discussed. The acquisition of communication systems in nonhuman species such as chimps, and problems of language pathology will also be addressed, but main emphasis will be on normal language development in the child.]

#### [440 Sleep and Dreaming

Spring. 4 credits. Limited to 15 students. Prerequisite: advanced undergraduate or graduate standing and permission of instructor. Not offered 1983–84.

J. Maas.]

**443 The Politics of I.Q.** Fall. 3 credits. Limited to 20 students. Prerequisites: elementary knowledge of theories and measurement of intelligence from prior courses or independent reading, and permission of instructor.

T R 2:30–4. H. Levin, L. Fitzgerald.

The research on the ethnic, racial, and sexual bases of intelligence will be taken as the primary example with which to discuss political and social influences on the choice of research topics, the methods of

investigation, and the interpretation of results. Some insights about these issues are available from historical changes in the research and by the comparison of research in various countries, particularly the United States and Great Britain. The writings of Jensen, Herrnstein, Burt, Eysenck, Kamin, and their critics will be studied. The genetics of intelligence will not be covered.

**[451 Quasi Experimentation** Spring, first seven weeks only. 1 credit. Prerequisite: Psychology 350 or equivalent. Offered in odd-numbered years. Not offered 1983–84; next offered 1984–85.

T R 10:10–12:05. R. Darlington.

Methods for approximating the rigor of laboratory experiments in field settings.]

**[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.

T R 10:10–11:40. Staff.

Mathematical approaches to psychological theory are discussed. Possible topics include choice and decision, signal detectability, measurement theory, scaling, stochastic models, and computer simulation.]

#### 467 Seminar: The Examined Self—A

Psychohistorical View

Spring. 4 credits. Prerequisites: 9 credits of psychology including Psychology 325 or equivalent, and permission of instructor before course enrollment.

T 12:20–2:15. H. 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.

**[468 American Madness** Spring. 4 credits. Limited to 15 students. Prerequisites: Psychology 325 and permission of instructor. Not offered 1983–84.

T 12:20–2:15. H. 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.]

#### 469 Psychotherapy: Its Nature and Influence

Spring. 4 credits. Limited to senior psychology majors. Prerequisites: Psychology 325 or equivalent and permission of instructor before course enrollment.

W 7:30–10:30 p.m. R. 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 also are considered. Presentations by therapists of differing orientations and experiential and role-play exercises may be an integral part of the seminar experience.

#### 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.

#### [471 Statistical Methods in Psychology I

Fall. 4 credits. Prerequisite: Psychology 201 or equivalent, or permission of instructor. Not offered 1983–84.

M W F 11:15. Staff.

Basic probability, descriptive and inferential statistics. Topics include parametric and nonparametric tests of significance, Bayesian inference, correlation, and simple linear regression. The level of the course is that of W. L. Hays, *Statistics for Psychologists*.]

**472 Statistical Methods in Psychology II** Spring, first seven weeks only. 2 credits. Prerequisite: Psychology 471 or 350 or permission of instructor. M W F 10:10. J. Cunningham.  
Analysis of variance, experimental design, and related topics. The level of the course is that of G. Keppel, *Design and Analysis: a Researcher's Handbook*.

**473 Statistical Methods in Psychology III** Spring, last seven weeks only. 2 credits. Prerequisites: Psychology 472 or permission of instructor. First day of class, March 12.  
M W F 10:10. R. Darlington.  
Multiple regression, at the level of *Multiple Regression in Behavioral Research*, by F. Kerlinger and E. Pedhazur.

**[475 Analysis of Nonexperimental Data]** Fall, first seven weeks only. 2 credits. Prerequisite: Psychology 473 or permission of instructor. Not offered 1983–84.  
T R 10:10–12:05. Staff.  
Factor analysis and other multivariate correlational methods.]

**476 Representation of Structure in Data** Fall. 3 credits. Prerequisite: one year of college mathematics (finite mathematics or calculus) and a course in the social sciences.  
T R 10:10–11:40. J. Cunningham.  
Representations of preferences, dominance data, psychological distances, and similarities will be discussed. Topics include unidimensional and multidimensional scaling, unfolding, individual differences scaling, hierarchical clustering, and graph-theoretic analysis.

**[477 The General Linear Model]** Fall, last seven weeks only. 2 credits. Prerequisite: Psychology 473 or equivalent. Not offered 1983–84; next offered 1984–85. First day of class, October 23, 1984.  
T R 10:10–12:05. R. Darlington.  
Applications of multiple regression to problems in analysis of variance, analysis of covariance, and nonlinear relationships.]

**[478 Psychometric Theory]** Fall, first ten weeks only. 3 credits. Prerequisite: Psychology 473 or permission of instructor. Not offered 1983–84; next offered 1985–86.  
T R 10:10–12:05. R. Darlington.  
Statistical methods relevant to the use, construction, and evaluation of psychological tests.]

**[479 Multisample Secondary Analysis]** Fall, last four weeks only. 1 credit. Prerequisite: Psychology 350 or equivalent. Not offered 1983–84; next offered 1985–86.  
T R 10:10–12:05. R. Darlington.  
Statistical methods for analyzing and integrating the results of many independent studies on related topics.]

**481 Advanced Social Psychology (also Sociology 481)** Fall. 4 credits. Limited to 30 students. Prerequisite: a course in social psychology or permission of instructor.  
T R 2:30–3:45. D. Regan.  
Selected topics in social psychology are examined in depth, with heavy emphasis on experimental research. Readings are usually original research reports. Topics discussed may include social comparison theory, social and cognitive dissonance, attribution processes, interpersonal attraction, and research methods in social psychology.

**482 Death and Dying** Spring. 4 credits. Limited to 40 juniors and seniors. Prerequisites: 6 credits in sociology or psychology.  
T R 2:30–4:25. W. Collins.  
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.

**[483 Socialization and Maturity (also Sociology 483)]** Spring. 4 credits. Limited to upperclass and graduate students or those who receive permission of instructor. Prerequisite: some work in psychology, sociology, or anthropology; some background in statistics is assumed. Not offered 1983–84, next offered 1984–85.  
T R 12:20–2:15. W. W. Lambert.  
Representative theories of research on socialization at different ages are analyzed, focusing particularly on the underlying processes. The newer topic of personal and sociocultural maturity is also analyzed, and its relation to socialization processes is evaluated in terms of recent evidence.]

**486 Interpersonal and Social Stress and Coping (also Sociology 486)** Spring. 4 credits. Limited to 25 upperclass students. Prerequisites: background in psychology and introductory statistics, or permission of instructor.  
T R 2:30–3:45. W. W. Lambert.  
A critical review of work in intrapersonal, interpersonal, situational, and sociocultural sources of stress and the major psychophysiological concomitants of such stress; resultant coping strategies and aids to coping. Data from laboratory, industry, and other cultures will be analyzed.

**488 Development in Context (also Human Development and Family Studies 488)** Fall. 4 credits. Prerequisites: two courses in developmental psychology or human development and one course in statistics, or permission of instructor.  
T R 8–9:55. U. Bronfenbrenner.  
The course presents a review and integration of existing knowledge about human development over the life course as a function of interaction between the changing properties of the person and of the place and time in which the person lives. Thus the presentation of the course material will proceed simultaneously along two dimensions: (1) sequential states of person-environment accommodation through the life course, and (2) crosscutting individual and contextual domains of person-environment accommodation.

**[489 Seminar: Selected Topics in Social Psychology and Personality (also Sociology 489)]** Fall. 4 credits. Prerequisites: one course in psychology and one course in sociology or permission of instructor. Not offered 1983–84.  
T 2:30–4:25. Staff.  
The specific topics of discussion vary, but the general emphasis is on a critical examination of the study of individuals in social contexts.]

**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 the instructor.  
M W F 2:30. H. Levin.  
The course aims to acquaint students with the recent history of psychology and to help them to identify important trends and underlying assumptions in contemporary writings. After a discussion of relevant nineteenth-century developments, a number of the major historical systems will be surveyed: the introspectionist, functionalist, behaviorist, and Gestalt psychologies. Emphasis will be on the ideas that have shaped modern psychology.

**491 Principles of Neurobiology, Laboratory (also Biological Sciences 491)** Fall. 4 credits. Limited to 24 students. Prerequisite: Biological Sciences 396 or Psychology 396 or Biological Sciences 496 or written permission of instructor.  
M W or T R 12:20–4:25, plus additional hours to be arranged. B. Land and staff.  
Laboratory practice with neurobiological preparations and experiments, designed to teach the techniques, experimental designs, and research strategies used to study biophysical and biochemical properties of excitable membranes, sensory receptors, and the

central nervous system transformations of afferent activity, as well as the characteristic composition and metabolism of neural tissue. Theoretical content at the level of Aidley's *The Physiology of Excitable Cells*.

**494 Junior Honors** Spring. 4 credits. Prerequisite: admission to the departmental honors program.  
Staff.

**498 Senior Honors Dissertation** Fall. 4 credits. Prerequisite: admission to the departmental honors program.  
Staff.

**499 Senior Honors Dissertation** Spring. 4 credits. Prerequisite: admission to the departmental honors program.  
Staff.

## 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.

**[502 Professional Writing in Psychology]** Spring. 1 credit. Limited to 15 students. Prerequisite: permission of instructor. Not offered 1983–84; next offered 1984–85.  
R 2:30–4:25. D. Bem.

A practicum for advanced undergraduate and graduate students in writing reports in psychology and other behavioral and social sciences, with the emphasis on the reporting of empirical research in journal format.]

## 510–511 Perception

## 512–514 Visual Perception

## 513 Learning

## 515 Motivation

## 517 Language and Thinking

## 518 Psycholinguistics

## 519–520 Cognition

## 521 Psychobiology

## 522 Topics in Perception and Cognition

## 523 Physiological Psychology

## 525 Mathematical Psychology

## 531 History of Psychology

## 535 Animal Behavior

## 541 Statistical Methods

## 543 Psychological Tests

## 544 Topics in Psychopathology and Personality

## 545 Methods in Social Psychology

## 547 Methods of Child Study

## 561 Human Development and Behavior

**[571 Proseminar in Human Experimental Psychology]** Fall or spring. 4 credits. Not offered 1983–84.  
W F 11:10–12:40. J. Cutting.

Research and theory will be surveyed in the areas of perception, memory, attention, language development, cognition, and quantitative methods, with the goal of providing the graduate student with a broad framework of issues in contemporary human experimental psychology.]

**572 Proseminar in Social and Personality Psychology** Spring. 4 credits.

W 2:30–4, F 12:15–1:45. D. Regan and others. Research and theory in social and personality psychology will be surveyed with the goal of providing the graduate student with a broad understanding of contemporary issues in these fields.

**[573 Proseminar in Biopsychology** Fall or spring. 4 credits. Offered every 1½ years. Not offered 1983–84; next offered 1984–85.

Hours to be arranged. Staff. Survey of research and thought on the evolution and mechanisms of behavior.]

**580 Experimental Social Psychology (also Sociology 580)**

**582 Sociocultural Stress, Personality, and Somatic Pathology (also Sociology 582)**

**583–584 Proseminar in Social Psychology (also Sociology 583–584)**

**[585 Social Structure and Personality (also Sociology 585)]**

**586 Interpersonal Interaction (also Sociology 586)**

**587 Personality (also Sociology 587)**

**588 Social Change, Personality, and Modernization (also Sociology 588)**

**591 Educational Psychology**

**595 Teaching of Psychology**

**[596 Improvement of College Teaching]**

**600 General Research Seminar** No credit.

**613 Seminar on Obesity and Weight Regulation (also Nutritional Sciences 613)** Spring. 3 credits. Prerequisite: a fundamental knowledge of psychology, physiology, and nutrition is essential. Offered in alternate years.

T R 1:30–3. D. Levitsky. This lecture-seminar surveys the literature on feeding behavior, body weight regulation, and eating disorders. The course attempts to cover the biological, psychological, and sociological factors involved in human feeding behavior and people's concern about their body weight.

**682 Social Psychology (also Sociology 682)**

**683 Seminar in Interaction (also Sociology 683)**

**684 Seminar: Self and Identity (also Sociology 684)**

**[685 Sex Differences and Sex Roles (also Sociology 685 and Women's Studies 685)** Not offered 1983–84; next offered spring 1985. Hours to be arranged. S. Bem.]

**[690 Nutrition and Behavior (also Nutritional Sciences 690)** Spring. 3 credits. Prerequisite: a fundamental knowledge of psychology, physiology, and nutrition is essential. Offered alternate years. Not offered 1983–84; next offered 1984–85.

T R 1:30–3. D. Levitsky. This lecture-seminar surveys the literature of the possible role nutrition may play as a determinant of human behavior. Topics covered include hypoglycemia, food additives and hyperkinesis,

ketogenic diets, malnutrition and intellectual development, megavitamin therapy, choline and memory. Emphasis is placed on the analysis of the arguments raised, their history, and review of studies advocating and refuting claims.]

**700 Research in Biopsychology**

**710 Research in Human Experimental Psychology**

**720 Research in Social Psychology and Personality**

**730 Research in Clinical Neuropsychology** Limited to Clinical Neuropsychology Program trainees.

**800 Master's Thesis Research in Biopsychology**

**810 Master's Thesis Research in Human Experimental Psychology**

**820 Master's Thesis Research in Social Psychology and Personality**

**900 Doctoral Thesis Research in Biopsychology**

**910 Doctoral Thesis Research in Human Experimental Psychology**

**920 Doctoral Thesis Research in Social Psychology and Personality**

**930 Doctoral Thesis Research in Clinical Neuropsychology** Limited to Clinical Neuropsychology Program trainees.

**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.

**101 Introduction to Psychology: The Frontiers of Psychological Inquiry**

**124 Introduction to Psychology: The Cognitive Approach**

**128 Introduction to Psychology: Personality and Social Behavior**

**209 Developmental Psychology**

**215 Introduction to Linguistics and Psychology**

**281 Interpersonal Relations and Small Groups (also Sociology 281)**

**286 Nonverbal Behavior and Communication (also Sociology 286)**

**325 Introductory Psychopathology**

**381 Social Psychology**

**385 Theories of Personality**

**469 Psychotherapy: Its Nature and Influence**

**543 Psychological Testing**

**Quechua**

See Modern Languages, Literatures, and Linguistics, p. 164

## Romance Studies

The Department of Romance Studies (J. Béreaud, chairman) offers courses in French literature, Italian literature, and Spanish literature. In addition, the department's program includes courses in French and Spanish languages and courses 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.

See Modern Languages, Literatures, and Linguistics, p. 164, for further information about majors and courses.

## Romanian

See Modern Languages, Literatures, and Linguistics, p. 164.

## Russian Literature

P. Carden, C. Emerson, G. Gibian (chairperson and director of undergraduate studies, 194 Goldwin Smith Hall, 256-4047), P. Schmidt, S. Senderovich, I. Serman, A. Zholkovsky

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, Literatures, and Linguistics, p. 164.

## Sanskrit

See Modern Languages, Literatures, and Linguistics, p. 163.

## Serbo-Croatian

See Modern Languages, Literatures, and Linguistics, p. 166.

## Sinhala

See Modern Languages, Literatures, and Linguistics, p. 166.

## Sociology

S. Caldwell, chairman; L. Meltzer, director of undergraduate studies (316 Uris Hall, 256-4266); R. Avery, S. Bacharach, R. L. Breiger, L. Cornell, B. Edmonston, G. Elder, D. P. Hayes, C. Hirschman, J. A. Kahl, W. W. Lambert, R. McGinnis, D. Nelkin, B. C. Rosen, B. Rubin, R. Stern, J. M. Stycos, H. Trice, R. M. Williams, Jr.

Sociology is concerned with the way individuals are organized into groups, networks, classes, institutions, and communities of varying influence and power. Its specialties include analyses of social conflict and accommodation, population trends, organizational and institutional change, and the structure of the family, law, religion, medicine, and science. All public policy, local or national, is affected by these sociological issues.

The Department of Sociology offers the opportunity to develop fundamental theoretical insight and practical research skills appropriate for the study of social life. Graduates of the department take up careers in social science (in university, government, and private settings) and in law, business, applied engineering, public policy planning, architecture, education, and other professions seeking men and women who demonstrate a disciplined understanding of society and social issues.

The Department of Sociology has particular strengths in: (a) research methods; (b) American institutions and public policy; (c) personality and social psychology; (d) population studies; and (e) social relations, offered jointly with the Department of Anthropology.

### The Major

The following are the requirements for a major in sociology: (1) the introductory courses, Sociology 101–201; (2) three courses in the foundations of sociological analysis: Sociology 301, 311, and one 400-level theory course; (3) 22 additional credits in sociology, including at least 4 credits in small seminars offered by the department to its advanced students. These 22 credits may include up to 12 credits in sociology courses offered by related departments if approved by the student's adviser. Students may obtain a list of approved courses at the Department of Sociology office in Uris Hall.

**Cornell-in-Washington program.** Sociology majors have an opportunity to apply to the Cornell-in-Washington program, in which students take courses and undertake a closely supervised internship during a fall or spring semester.

**Internships.** The department seeks to aid sociology majors in locating and participating in structured, off-campus field experiences or internships. Interested sociology majors should speak with the director of undergraduate studies.

**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. Special opportunities are available to work on projects sponsored by the Center for International Studies, the International Population Program, the Social Psychology Laboratory, and the Cornell Institute for Social and Economic Research. Interested students may direct inquiries to any faculty member.

**Honors.** The honors program provides sociology majors with an opportunity to study selected problems in depth and to carry out independent research under the guidance of a faculty member. Application for the honors program should be made late in the junior year. To qualify for a Bachelor of Arts

degree with honors in sociology a student must maintain a cumulative average of at least B+ in all sociology courses and earn a grade of *cum laude* or higher on the honors essay.

### Freshman Seminars

#### 100.2 The Social Order In Detective Fiction Spring. 3 credits.

M W 8:40–9:55. S. Caldwell.

That fiction and social science are two ways of commenting on human behavior is well known, but less familiar are the specific ways in which these two approaches intersect and diverge. Our seminar will address this issue by drawing upon that vivid American literary phenomenon, the "hard-boiled" detective story. Students will read stories by the classical authors—Dashiell Hammett, Cornell Woolrich, James M. Cain, and Raymond Chandler, as well as by more contemporary authors such as Ross MacDonald, Stephen Greenleaf, Jerome Charyn, Robert Parker, and James Crumley. Sociological works, for example, studies of actual detectives and of urban crime, will be used together with the fictional accounts.

#### 100.3 Sociology of Organizations Spring. 3 credits.

M W F 9:05. D. Fish.

This seminar will explore a ubiquitous but often misunderstood phenomenon: organizations. Sociological insights will frame our inquiry into the structure and function of formal organizations. Essays will serve to deepen student appreciation of the expanding role of organizations in modern society.

#### 100.4 The Family Spring. 3 credits.

T R 8:40–9:55. S. Rose.

Cross-cultural and historical study of the family, focusing on such issues as government intervention in the family and family violence. Weekly writing assignments with option of rewriting papers.

#### 100.5 Hard Choices (also Biology and Society) 102 Fall.

M W F 11:15. S. Siskin.

Many people believe that no restrictions should be placed on the pursuit and dissemination of scientific, medical, and technical knowledge. But what if a research technique may endanger public health and safety, or published research findings can be exploited for bad ends? Are restrictions then appropriate? What form should they take? Who should decide? We will examine how such questions challenge traditional attitudes toward knowledge and pose dilemmas for science, medicine, engineering, universities, and society. Discussion will be based on readings in drama, fiction, philosophy, and debate over such issues as genetic engineering.

#### 105 Mass Media and Society Fall. 3 credits.

T R 8:40–9:55. R. Goldsen.

The unifying topic of the seminar is the societal impact of television. The focus of attention is how to observe and decode the medium's distinctive languages, such as imagery, drama, music, sound, color, and camera work. Sample topics include dilemmas and controversies about mass media effects; latent and manifest meanings; the language of television commercials; signs, symbols, myth, and ideology. Readings include works in semiotics as well as in the social sciences. Lectures include video demonstrations. Students submit biweekly essays and prepare a class project.

#### 109 Social Change Fall. 3 credits

T R 2:30–3:45. B. Rubin.

In sociology the study of social change is both theoretical and historical. History provides sociologists with a record that contains infinite diversity. The sociologist's mission is to make sense of this diversity. Ultimately, the study of social change attempts to relate individual changes in attitudes and behaviors to large-scale changes in institutions. We will study change in the United States, both past and

present, with a substantive focus on modernization and industrialization; economic, ecological, and technological sources of change; and reform versus revolution as sources of change.

### Introductory Courses

The recommended introductory sequence is Sociology 101–201, but either course may be taken alone. Sociology 101 provides a comprehensive survey of the discipline. Sociology 201 is somewhat more advanced; it introduces students to the discipline through an intensive analysis of case studies and research reports. Fewer topics are covered in 201 than in 101, but these are treated in greater detail. Either course may serve as prerequisite to most 200- and 300-level courses in the department.

#### 101 Introduction to Sociology Fall and spring. 3 credits.

Fall: M W 12:20. Spring: M W 11:15, plus one hour to be arranged. One midterm evening prelim each term. Fall: faculty; spring: B. Rubin.

In the fall, virtually the entire professorial staff of the Department of Sociology participates in teaching this course, each professor lecturing on his or her own specialty. In the spring, the course is taught by a single professor. Topics covered include most of the following: socialization, culture, deviance, social control, interpersonal interaction, small groups, organizations, bureaucracy, family, inequality, mobility, race and ethnic relations, population dynamics, urbanization, public opinion, social change, social movements, modernization, methods of research, applications. Weekly section meetings actively involve students in the practical utilization of sociology. Case histories and application exercises are analyzed concerning social problems such as urban tensions, cultural differences, racial conflict, gender identity, expanding populations, and high rates of crime.

#### 201 Sociological Analysis (also Human Development and Family Studies 201) Fall. 3 credits.

M W F 11:15. R. Breiger and staff.

With its emphasis on the evaluation of case studies and research reports, this course aids in the development of analytical skills and critical abilities. An introduction to the foundations of sociological analysis is followed by student participation in three other modules. Each module concentrates on one social issue of vital concern while illustrating the distinctive ways in which sociologists define questions, evaluate the answers, and build upon previous research.

### General Education Courses

#### [205 Understanding the Language of Television Images (also Linguistics 205) Fall. 4 credits. Not offered 1983–84.

T R 9:05 and M 2:30. L. Waugh, R. Goldsen.

Images coming to us through the television screen convey connotative and denotative meanings that are widely understood, quite apart from the verbal language of dialogue and narration. How do we read these images? What is the underlying grammar-like structure that arranges them as signs and symbols in a shared meaning system? The course addresses these questions, using the techniques and concepts of content analysis (from sociology) and semiotics (from linguistics) to decode images in television's most ubiquitous, repetitive, and stylized content—product commercials. Readings include works in semiotics as well as in the social sciences. Students are encouraged to prepare their own projects. Extensive use of visual materials, class discussions, and frequent short papers.]

#### [207 Ideology and Social Concerns Fall. 3 credits (4-credit option available). Not offered 1983–84.

M W F 11:15. R. M. Williams, Jr.

Analysis of social and cultural bases of public policies at national, state, and local levels. Relates demographic, social, and cultural factors to the changing recognition of problems and to shifting modes of collective action such as direct mobilization, legislation, administration, and adjudication. Public issues examined include affirmative action, civil rights, environmental regulation, military affairs, social security and income maintenance, health, medicine, bioethics, centralization, and local control. Deals with two basic dilemmas of social choice: the problem of the commons and the problem of collective action.]

**[209 Conflict and Cooperation** Spring, 3 credits (4-credit option available). Not offered 1983–84.

M W F 10:10. R. M. Williams, Jr.  
Are human societies fundamentally cooperative or conflictual? In what ways? Why? And with what consequences? Examination of contemporary sociological analyses and the views of such precursors as Hobbes, Marx, Sumner, and Simmel. Data from recent studies of conflict and conflict reduction are discussed.]

**214 Sociological Perspectives on Housing (also Consumer Economics and Housing 148)** Spring 3 credits. Enrollment limited to 6 sections of 20 students each. S-U grades optional.

Lecs, T R 10:10; secs, M 9:05 or 2:30, T 11:15 (2), or W 10:10 or 2:30. A. Shlay.  
An introductory sociology course analyzing the distribution of housing and population within urban areas. Students focus on the link this urban social and spatial structure has to the quality of urban life. Topics include urban ecology, mobility and migration patterns, suburbanization, segregation, urban social stratification, community power, crime, and poverty.

**222 Studies In Organizational Behavior: Regulating the Corporation (also Industrial and Labor Relations 222)** Fall, 3 credits.

M W 2:30–3:45. R. Stern.  
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 strategy, change, and political influence. The role of interest groups such as consumer or citizens' organizations is also considered. Research and case materials focus on the implementation of environmental protection, occupational health and safety, equal opportunity, antitrust, and rate-setting regulations.

**230 Population Problems** Spring, 3 credits (4-credit option available).

T R 10:10–11:25, plus one hour to be arranged.  
J. M. Stycos.  
The practical and scientific significance of population growth and composition. Fertility, migration, and mortality in relation to social and cultural factors and in relation to questions of population policy. National and international data receive equal emphasis.

**238 Historical Development of Women as Professionals, 1800–1980 (also Women's Studies 238 and Human Development and Family Studies 258)** Fall, 3 credits.

T R 2:30–4. J. Brumberg.  
The historical evolution of the female professions in America, including prostitution, midwifery, nursing, teaching, librarianship, social work, and medicine. Lectures, readings, and discussions 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.

**240 Personality and Social Change** Spring, 3 credits (4-credit option available).

T R 2:30–3:45. 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.

**[241 Applied Sociology** Fall, 3 credits (4-credit option available). Not offered 1983–84.

M W F 10:10. S. Caldwell.  
Concentrates on sociology applied to actual decisions by regulatory commissions, executive agencies, courts, Congress, and other public policy makers. How does sociology become useful? Who makes it useful? What effects do personal values have on its uses? How well does expert knowledge coexist with political process? The course will cover topics such as welfare reform, teenage pregnancies, Social Security, day-care school effectiveness, a national family policy, and energy.]

**[242 Social Welfare in Europe and North America** Spring, 3 credits. Prerequisite: at least one course in sociology. Not offered 1983–84.

M W F 9:05. S. Caldwell.  
This course will examine the nature and origin of the welfare state and some of its problems. Drawing on historical, comparative, and statistical evidence, we ask how particular welfare state programs (such as Social Security, health, housing, income maintenance, et al.) affect individuals, families, communities, and eventually the entire economy and society. How would life be different without welfare state programs? How serious are the problems facing the Western welfare states? What social choices face the welfare states, and what are the most likely directions in the future?]

**243 Family** Spring or summer, 3 credits (4-credit option available).

T R 10:10, plus one hour to be arranged. Spring.  
B. C. Rosen.  
A social and historical analysis of the family both in the West and cross-culturally. Specific areas examined include sex roles, socialization, mate selection, sex and sexual controls, internal familial processes, divorce, disorganization, and social change.

**245 Inequality in America** Spring, 3 credits (4-credit option available).

M W F 9:05. B. Rubin.  
This course deals with sociological explanations for various forms of social and economic inequality, particularly inequalities associated with class and work. We will describe systems of inequality, analyze various theoretical explanations for those systems, study their social and psychological consequences, and examine the various structures designed to reduce or eliminate inequality. Though covering a broad range of topics, we will be particularly concerned with capitalist societies and the changes in capitalist socioeconomic organization that have occurred in the last one hundred years or so.

**[248 Politics in Society** Spring, 3 credits (4-credit option available). Not offered 1983–84.

T R 2:30–4. Staff.  
An examination of the relations between economic, social, and political structures in industrial societies, with particular emphasis on the United States. Topics included are democratic forms of participation in organizations and society at large, social movements, party systems, the structure of power and its legitimation, and voting behavior.]

**252 Public Opinion** Fall, 3 credits (4-credit option available).

T R 2:30–3:20, plus one hour to be arranged.  
R. Goldsen.

Analysis of the impact of communications systems on the institutional habitat within which public opinion forms. New communications techniques and their social significance are analyzed.

**[255 Sociology of Science and Technology** Fall 3 credits (4-credit option available). Not offered 1983–84.

T R 2:30, plus one hour to be arranged.  
How the growth of knowledge is facilitated and impeded by the social behavior of scientists, including competition, teamwork, communication, secrecy, conformity, and deviance; causes and consequences of scientific revolutions; factors affecting scientific careers; history of science as a social institution.]

**257 Contemporary Japanese Society (also Asian Studies 257)** Fall, 3 credits (4-credit option available).

T R 8:40–9:55. L. Cornell.  
Japan is often advanced as a model of a modern industrial society, a model the United States would do well to imitate. This course will examine whether this is a reasonable comparison by analyzing the life of the urban white-collar Japanese manager. Topics to be discussed include the structure of the firm, family life, the roles of women and men, equal opportunity and the educational system, problems of retirement and the aging of the population, the treatment of deviance, and the ethical and moral values that underlie the system. Students will learn how to analyze an industrial democracy whose roots are not in the Western European tradition.

**265 Hispanic Americans** Spring, 3 credits (4-credit option available).

T R 2:30–4. H. Velez.  
Analysis of the present-day Hispanic experience in the United States. An examination of sociohistorical backgrounds as well as the economic, psychological, and political factors that converge to shape and influence a Hispanic group-identity in the United States. Perspectives are developed for understanding the diverse Hispanic migrations, the plight of Hispanics in urban and rural areas, and the unique problems faced by the different Hispanic groups. Groups studied include Dominicans, Chicanos, Cubans, and Puerto Ricans.

**[277 Psychology of Sex Roles (also Psychology 277 and Women's Studies 277)** Spring, 3 credits (4-credit option available). Prerequisite: an introductory psychology course. Not offered 1983–84.

T R 2:30–4. S. Bem.  
This course addresses the question of why and how adult women and men come to differ in their overall life styles, work and family roles, personality patterns, cognitive abilities, etc. This broad question is examined from five perspectives: (a) the psychoanalytic perspective, (b) the biological perspective, (c) the historical and cultural evolutionary perspective, (d) the child development perspective, and (e) the social-psychological and contemporaneous perspective. Each of these perspectives is also brought to bear on more specialized phenomena relating to the psychology of sex roles, including psychological androgyny, women's conflict over achievement, the male sex role, egalitarian marriage relationships, gender-liberated child-rearing, female sexuality, homosexuality, and transsexualism.]

**280 Introduction to Social Psychology (also Psychology 280)** Spring, 3 or 4 credits; the additional (or fourth) credit is given for attendance at the optional section meeting and the term paper. Prerequisite: an introductory psychology course.

T R 10:10–11:25. T. Gilovich.  
An introduction to research and theory in social psychology. Topics include human processing of social information; social influence, persuasion, and attitude change; social interaction and group phenomena. The application of social psychological knowledge to current social problems will also be discussed.



## Intermediate Courses

**[284 Social-Psychological Theories and Applications (also Psychology 284)]** Fall. 3 credits. Not offered 1983–84.

T R 8:40–9:55. Staff.

Emphasis is given to those aspects of personality and social psychology that have led to effective practical applications or that provide reasonable insights into the genesis and/or amelioration of social and personal problems.]

**[301 Evaluating Statistical Evidence]** Spring. 4 credits.

M W F 11:15. R. Breiger.

A first course in the use of statistical evidence in the social sciences. Theory is supplemented with numerous applications. Includes an introduction to multivariate causal analysis.

**[307 Collective Behavior and Social Movements (also Human Development and Family Studies 307)]** Fall. 3 credits (4-credit option available). Not offered 1983–84.

T R 2:30–4. G. Elder.

An inquiry into social behavior that breaks with institutionalized or conventional forms, such as acting crowds, riots, social movements, and revolution. Analysis of antecedent conditions, emergent forms, processes, and consequences. Historical and contemporary studies are covered.]

**[310 Sociology of War and Peace]** Spring. 4 credits. Prerequisite: a course in sociology or government. Not offered 1983–84.

M W F 9:05. 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.]

**[311 Primary Data Collection and Design]** Spring. 4 credits. Prerequisite: a course in sociology.

T R 2:30–4:30. D. 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.

**[324 Organizations and Deviant Behavior (also Industrial and Labor Relations 324)]** Spring. 3 credits. Limited to 40 students. Prerequisite: one or more courses in both sociology and psychology.

H. Trice.

Focus is on the relationship between organizations and deviant behavior. Covers (1) the nature and etiology of psychiatric disorders, particularly schizophrenia, the psychoneuroses, and psychosomatic disorders; (2) organizational factors related to these disorders and to the more general phenomena of role conflict and stress; (3) an examination of alcoholism as a sample pathology, in terms of personality characteristics and precipitating organizational factors; (4) evaluation of organizational responses to deviance; (5) the nature of self-help organizations such as Alcoholics Anonymous; and (6) the structure and functioning of the mental hospital.

**[340 Organizational Culture (also Industrial and Labor Relations 329)]** Fall. 3 credits. Prerequisite: upperclass standing.

M W 2:30–3:45. H. Trice.

This course reviews the concepts of culture, subculture, and countercultures as they have evolved in sociology and anthropology, applying them to formal organizations such as corporations and unions. Topics covered include the nature of ideologies as sense-making definitions of behavior; cultural forms that carry these messages, such as rituals, symbols, myths, sagas, legends, and organizational stories; types of ceremonial behavior, such as rites of passage, rites of enhancement, and rites of degradation; and the role of language, gestures, physical settings, and artifacts. Emphasis will be placed on empirical examples from both the organizational behavior literature and the professor's field research.

**[341 American Society]** Fall. 4 credits. Prerequisite: a course in sociology or permission of instructor.

M W F 9:05. R. M. Williams, Jr.

Analysis of a total societal system. Critical study of the institutions of kinship, stratification, the economy, the policy, education, and religion. Special attention is given to values and their interrelations and to deviance and evasion. A survey of the groups and associations making up a pluralistic nation is included.

**[342 Women and Society]** Spring. 4 credits.

M W F 10:10. L. Cornell.

This course examines how women's roles in the family and household are influenced by their control over their reproductive abilities, their participation in the household economy, and their ownership of property. It contrasts women's roles in Japan with those in China and investigates the narrowing of women's opportunities and symbolic position that has accompanied industrialization in Japan.

**[348 Sociology of Law]** Spring. 4 credits.

M W F 1:25. C. Bohmer.

Legal decisions and legal practices viewed within the context of society's institutions and customs. Topics vary from semester to semester but deal with issues such as civil rights versus society's rights, variations in permissible sexual practices in different cultures, the social organization of police departments and its effects on justice and equity, changing divorce laws in relation to changes in the status of women, the role of psychiatry in the legal process, and judicial attitudes toward rape victims.

**[355 Social and Political Studies of Science (also Science, Technology, and Society 355)]** Spring. 3 credits.

W 2:30–4:30. D. Chubin.

A view of science, less as an autonomous activity than as a social and political institution. The focus is on its relationship to government, the media, religion, and education. Drawing from recent controversies over science, such questions as ethics and social responsibility in science, struggles to maintain internal control over research and over the teaching of science, and the concept of limits to inquiry are discussed.

**[356 Contemporary Sociology for Scientists and Engineers]** Spring. 4 credits. Prerequisite: elementary finite mathematics or permission of instructor. Not offered 1983–84.

R. McGinnis.]

**[357 Medical Sociology]** Fall. 4 credits.

Prerequisite: a course in the social sciences. Not offered 1983–84.

M W F 9:05. B. Edmonston.

Health, illness, death, and the health institutions from a sociological perspective. Factors affecting health care; organization of the medical professions; health

and illness behavior; social epidemiology; and key issues in policies affecting the administration and delivery of medical care in the United States.]

**[359 American Families in Historical Perspective (also Human Development and Family Studies 359 and Women's Studies 357)]** Spring. 3 credits. S-U grades optional. Prerequisites: HDFS 150 or one 200-level social science or history course. Human ecology students must register for HDFS 359.

T R 2:30–4. 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.

**[364 Race and Ethnicity]** Fall. 4 credits.

T R 10:10–11:25. C. Hirschman.

An examination of the dynamics of race and ethnic relations in the United States and other societies. Alternative explanations—melting-pot assimilation theories, internal colonialism, and Marxist perspectives—are compared and evaluated. Topics include an historical comparison of black and white immigrants, the case of Asian-Americans, the causes and consequences of residential segregation, and women as a minority group. Other multiethnic societies such as South Africa and Malaysia are also studied.

**[365 Criminology]** Spring. 4 credits. Not offered 1983–84.

M W 2:30, plus one hour to be arranged. J. Jacobs.

This course examines crime as a social phenomenon. It takes both a historical and cross-cultural approach in order to investigate the processes by which different societies generate different crime problems. Attention is paid to the historical evolution of criminology as a discipline and to the most prevalent theories of criminology and crime causation. Special attention is also placed on such topics as white-collar crime, organized crime, and youth gangs. In light of the analysis of crime as a social phenomenon, various strategies of crime control are considered critically.]

**[367 After the Revolution: Mexico and Cuba]**

Spring. 4 credits. Prerequisites: two courses in the social sciences. Not offered 1983–84.

M W F 1:25. J. Kahl.

A comparison of the economic, political, and social development of Mexico and Cuba following their revolutions. Assigned readings will be in English.]

**[368 Twentieth-Century Brazil (also History 348)]** Spring. 4 credits. Prerequisites: two courses in the social sciences. Not offered 1983–84.

M W F 1:25. J. Kahl, T. Holloway.

A study of the style of development in economy, polity, and society followed by contemporary Brazil and an analysis of the contradictions that led to the military coup of 1964 and its aftermath. Some comparisons with other Latin American countries are made. Assigned readings are in English.]

**[373 Organizational Behavior Simulations (also Industrial and Labor Relations 373)]** Spring, weeks 1–7. 2 credits. Prerequisites: I&LR 120 and 121 or equivalent.

Hours to be arranged. R. Stern.

Basic principles of organizational behavior are studied through readings and participation in two 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. Organizational design, decision making, and conflict are the central topics of discussion. The contrasting bases of power in the two organizations permit the study of the assumptions underlying organizational structure and process.

**378 Economics, Population, and Development (also Economics 378)** Fall. 4 credits.

M W F 11:15. R. Avery.

An introduction to population from an economic perspective. Particular attention is paid to economic views of population size, fertility, mortality, and migration and to the impact of population change on development, modernization, and economic growth.

**[379 The Social Psychology of Social Movements]** Fall. 4 credits. Not offered 1983–84.

T R 1:15–2:30. B. Rosen.

An analysis of the social and psychological factors that give rise to social movements, affect how they function, and cause them to change. Examples will be drawn from political, religious, commercial, psychoanalytic, and women's movements in various parts of the world.]

**380 Beliefs and Attitudes (also Psychology 380)** Spring. 4 credits.

M W F 1:25. L. Meltzer.

An intermediate course in social psychology. Attitudes are viewed as emotionally charged beliefs that underlie ideologies, values, interpersonal feelings, and religion. The course will analyze the historical roots and current status of three approaches to the systematic analysis of beliefs and attitudes: (1) the reasoned action theory of Fishbein and Ajzen (how beliefs develop from information; how attitudes develop from beliefs; how these in turn lead to intentions and behavior); (2) the balance theory of Fritz Heider and its several derivatives (how beliefs and attitudes form in harmony with our values, relationships with other people, and our other beliefs and attitudes); and (3) the functional theories in psychology, psychoanalysis, and anthropology (how beliefs and attitudes help us live our lives as personalities and as members of a society).

**[381 Person Perception and Expression (also Psychology 381)]** Spring. 4 credits. Prerequisite: a course in social psychology or personality, or one course in psychology and one course in sociology, or permission of instructor. Not offered 1983–84.

M W F 1:25. L. Meltzer.

An intermediate course in social psychology, focusing on people's judgments of one another and on their attempts to manipulate how others judge them. Impressions, attributions, biases, self-concept, self-disclosure, self-presentation, deception, body language, conversational style, and facial expressions are relevant topics.]

**383 Social Interaction (also Psychology 383)**

Spring. 4 credits. Prerequisite: a course in social psychology.

M W 2:30–4:30. D. Hayes.

Fine-grain analyses of social behavior, its structure, changes, and determinants. Extensive practice in analysis of filmed and taped interactions. Student research is required throughout the course.

**384 Cross-Cultural Psychology (also Psychology 384)** Spring. 4 credits. Prerequisites: a course in psychology and one in either sociology or social or cultural anthropology, or permission of instructor.

M W F 11:15–12:05. W. W. Lambert.

A critical survey of approaches, methods, discoveries, and applications in emerging attempts to study human nature, experience, and behavior cross-culturally. Focus on studies of cognition, values, socialization, sociolinguistics, personality, attitudes, stereotyping, ideology, sociocultural development, and mental illness. Problems of how one can learn another culture will also be dealt with.

**385 Theories of Personality (also Psychology 385)** Fall. 4 credits. Prerequisite: Psychology 101 or 275, or permission of instructor.

T R 1–2:15. W. W. Lambert.

An intermediate analysis of comparative features of the historically and currently important theories of personality, with an evaluation of their systematic empirical contribution to modern personality study, to psychology, and to other behavioral sciences.

**Advanced Courses**

The following courses are intended for advanced undergraduates with substantial preparation as well as for graduate students in sociology and related disciplines. Students who are not sure whether their background is sufficient for a particular course should consult the professor in charge.

**401 Intermediate Sociological Theory (also Rural Sociology 401)** Fall. 4 credits.

T R 10:10–12:05. P. Eberts.

An advanced undergraduate seminar for senior majors in sociology and rural sociology. The course will focus on (1) the central concepts of the sociological tradition; (2) major classical theorists (Marx, Weber, Durkheim, de Tocqueville) and contemporary counterparts; (3) application of the classical ideas in contemporary research.

**403 Social Networks and Social Structures** Fall. 4 credits.

T 2:30–5:30. 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 organizational relations, community studies, social mobility, and dependence relations among nations. Emphasis on the mutual relevance of theories and operational research procedures.

**[416 Business, Labor, and the State]** Spring. 4 credits. Not offered 1983–84.

M W F 12:20. B. Rubin.

An advanced seminar in the political economy of capitalism. Political economy is an approach to the study of social structure that emphasizes the interrelations of political forces and economic structures in a concrete historical context. The underlying concerns of the course and the issues that will structure most of the reading and discussions are the distributional consequences of advanced capitalism. For example: Who benefits from certain economic processes (inflation, unemployment, economic growth)? Does state intervention in the economy freeze existing distributional structures? Does state activity redistribute the economic pie from one group to another? Has the working class materially benefited from unionization and militancy?]

**420 Mathematics for Social Scientists (also City and Regional Planning 520)** Fall. 2-4 credits.

M W 2:30–4:30; lab, F 2:30–4:30. R. McGinnis.

Elementary matrix algebra, probability theory, and calculus.

**422 Sociology of Industrial Conflict (also Industrial and Labor Relations 425)** Spring. 4 credits.

R. Stern.

The focus is on the variety of theoretical and empirical evidence available concerning social, economic, and political causes of industrial conflict. The manifestations of conflict such as strikes, labor turnover, absenteeism, and sabotage, and the influence of the environments in which they occur is emphasized.

**[423 Evaluation of Social Action Programs (also Industrial and Labor Relations 423)]** Fall. 3 credits. Not offered 1983–84.

Hours to be arranged. H. Trice.

A consideration of the principles and strategies involved in evaluation research; experimental

research designs, process evaluation, and adaptations of cost benefits and cost efficiency to determine the extent to which intervention programs in fields such as training and therapy accomplish their goals. The adaptation of these strategies to large social contexts such as child guidance clinics, mental health clinics, and programs in the poverty areas such as Head Start is considered. Includes fieldwork and emphasizes assessment of program implementation.]

**424 Multivariate Analysis with Quantitative Data**

Spring. 4 credits. Prerequisite: a college course in statistics (such as Sociology 301) and matrix algebra.

T R 10:10–11:40 and one hour to be arranged.

R. McGinnis.

The general linear regression model with interval-scaled variables. Detecting violations of assumptions of the model in real data and providing remedies. Both single and multiple equation models (including path analysis).

**425 Categorical and Longitudinal Data Analysis**

Fall. 4 credits. Prerequisite: Sociology 424 or equivalent.

M W 10:10–11:40. S. Caldwell.

Techniques for including categorical (discrete) variables in multivariate models and for analyzing longitudinal data. Linear probability, log-linear, logit, probit, and dummy variable forms are covered. Real and simulated data exercises are used to examine the relationship of research design to analysis and also to demonstrate the advantages of longitudinal data. Emphasis on applications.

**[426 Policy Research (also Rural Sociology 426 and Consumer Economics and Housing 426)]**

Spring. 3 credits. Prerequisite: a course in multivariate statistics. Not offered 1983–84.

Hours to be arranged. S. Caldwell.

Case studies of recent research sponsored and carried out with the explicit purpose of affecting policy. Since policy research often requires unusually rigorous evidence, we assess the strength and weaknesses of alternative research designs: experimental versus observational; aggregate versus micro; longitudinal versus cross-sectional; large samples versus case studies. Since policy research often faces strong pressures, we examine the politics of putting research questions on the agenda, preserving the investigator's independence, and interpreting research results. Other topics include academic and nonacademic settings for policy research; policy research and the disciplines; forecasting; simulations; careers in policy research.]

**[427 The Professions: Organization and Control (also Industrial and Labor Relations 427)]** Fall. 4 credits. Not offered 1983–84.

M W F 10:10. R. Stern.

The professions (including medicine, law, and several others) are the cases used in this course to examine issues of occupational organization and control. Professional associations attempt to set standards of ethics and practice, regulate educational programs, maintain specific images, and control the supply of entrants to professions. How do such associations function and how successful is their attempt at regulation of professional conduct? How might the potential transformation of some professional associations into union-style organizations be interpreted? These issues are considered in the context of the role of professions in contemporary society.]

**430 Social Demography** Spring. 4 credits.

Prerequisites: junior class standing or permission of instructor.

T R 8:40–9:55. C. Hirschman.

A survey of the methods, theories, and problems of contemporary demography. Special attention is directed to the social determinants and consequences of fertility, mortality, and migration. The populations of both developed and developing areas are examined.

**431 Techniques of Demographic Analysis** Fall. 4 credits. Prerequisite: Sociology 230 or 330.

T R 10:10–11:30. B. Edmonston.  
A description of the nature of demographic data and the specific techniques used in their analysis. Mortality, fertility, migration, and population projection are covered, as well as applications of demographic techniques to other types of data.

**434 Human Fertility in Developing Nations** Spring. 4 credits. Prerequisite: Sociology 230 or permission of instructor. Offered alternate years. Not offered 1983–84.

W 3:30–6. 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.]

**439 Social and Demographic Changes in Southeast Asia** Fall. 4 credits. Not offered 1983–84.

R 2:30–5. C. Hirschman.  
Survey of population trends, including fertility, mortality, marriage, migration, and urbanization in Southeast Asia. Demographic patterns are studied as determinants and consequences of changes in social, economic, and familial institutions in different societies. General demographic theory and methods will be introduced as necessary to understand contemporary studies of demographic change in Southeast Asia.]

**440 Educational Institutions** Spring. 4 credits. Not offered 1983–84.

T R 10:10–11:35. Staff.  
The role of educational institutions in industrialized societies is studied. The primary focus will be on the debate between those who see educational institutions as extending opportunity and assimilating marginal groups and others who see them as arenas of conflict in which privileged groups successfully struggle to maintain their advantages.]

**442 Family and Kinship in History** Spring. 4 credits.

M W F 12:20. L. Cornell.  
This course analyzes fertility and mortality patterns and their effect on household structure and family roles in seventeenth-, eighteenth-, and nineteenth-century societies. It compares Western European patterns with those in Japan. It asks what kinds of questions have been proposed, what sources are available to investigate them, and how their reliability can be evaluated. Topics for discussion may include the prevalence of family limitation, changing ideas of childhood, men's and women's adult roles, the influence of modes of transmission of property on family roles, and the treatment of the elderly.

**443 Seminar: Community Studies** Spring. Not offered 1983–84.

T 2:30–4:30. J. Kahl.  
Reading and discussion, in a seminar style, of some classic studies of small towns and urban districts in the United States. Some likely selections will be *Middletown*, *Yankee City*, *Street Corner Society*, *Urban Villagers*, *Talley's Corner*, *Behind Ghetto Walls*, *Small Town in Mass Society*.]

**444 Contemporary Research In Social Stratification** Fall. 4 credits. Not offered 1983–84.

T 2:30–5. R. Breiger.  
Stratification and mobility as paired concepts requiring mutual articulation. The interplay of structure (occupational groups, labor markets, organizations, classes) and process (tracking, career trajectories, socioeconomic attainment).]

**445 Law and Social Theory** Spring. 4 credits. Prerequisite: Sociology 348 or permission of instructor or graduate standing. Not offered 1983–84.

T 3:35–5:30.

Major intellectual traditions contributing to what is loosely called the sociology of law. Attention is paid to the classical theorists—Weber, Durkheim, and Marx—as well as to contemporary American and European legal and sociological scholars. The underlying theme is the relationship of law to social order.]

**447 Social Aspects of Housing and Neighborhood (also Consumer Economics and Housing 443)** Fall. 3 credits. Prerequisites: Consumer Economics and Housing 148 or 247. S-U grades optional.

T R 10:10–11:25. A. Shlay.  
The relationships between housing and social behavior and organization are examined. Levels of analysis include the physical features of housing that influence human behavior and the quality of life, the housing composition of neighborhoods, and the congruency between local housing and population.

**454 Religion and Secularism In Western Society** Spring. 4 credits. Prerequisite: Sociology 101 or permission of instructor. Not offered 1983–84.

M W F 9:05. Staff.  
The interrelationship of culture, society, and religion. Religion and social stratification, religion and economic and political institutions, and social change and religion. The major emphasis will be on American society and American religious institutions.]

**462 Society and Consciousness** Spring. 4 credits. Limited to 15 students. Prerequisite: permission of instructor. Not offered 1983–84.

Hours to be arranged. R. Golden.  
An examination of the role of communications systems in the formation of human consciousness.]

**481 Advanced Social Psychology (also Psychology 481)** Fall. 4 credits. Limited to 30 students. Prerequisite: a course in social psychology or permission of instructor.

T R 2:30–3:45. D. Regan.  
Selected topics in social psychology are examined in depth, with heavy emphasis on experimental research. Readings are usually original research reports. Topics discussed may include social comparison theory, social and cognitive determinants of the emotions, cognitive dissonance, attribution processes, interpersonal attraction, and research methods in social psychology.

**483 Socialization and Maturity (also Psychology 483)** Spring. 4 credits. Limited to upperclass and graduate students or those who receive permission of instructor. Prerequisite: some work in psychology, sociology, or anthropology; some background in statistics is assumed. Not offered 1983–84.

T R 12:20–2:15. W. W. Lambert.  
Representative theories of research on socialization at different ages are analyzed, focusing particularly on the underlying processes. The new topic of personal and sociocultural maturity is also analyzed and its relation to socialization processes is evaluated in terms of recent evidence.]

**486 Interpersonal and Social Stress and Coping (also Psychology 486)** Spring. 4 credits. Limited to 25 upperclass students. Prerequisite: background in psychology and introductory statistics, or permission of instructor.

T R 2:30–3:45. W. W. Lambert.  
A critical review of work in intrapersonal, interpersonal, situational, and sociocultural sources of stress; the major psychophysiological concomitants of such stress; resultant coping strategies and aids to coping. Data from the laboratory, industry, and other cultures will be analyzed.

**491 Selected Topics In Sociology** Fall or spring. 2–4 credits. Prerequisite: permission of instructor.

Hours to be arranged.

**495 Honors Research** Fall or spring. 4 credits. Limited to sociology majors in their senior year. Prerequisite: permission of instructor.

Hours to be arranged. S. Caldwell and staff.

**496 Honors Thesis: Senior Year** Fall or spring. 4 credits. Prerequisite: Sociology 495.

Hours to be arranged. S. Caldwell and staff.

**497 Social Relations Seminar (also Anthropology 495)** Spring. 4 credits. Limited to seniors majoring in social relations.

Staff.

## 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. Lists and descriptions of seminars are available from the department well in advance of each semester. The list below indicates seminars that are likely to be offered 1983–84, but others may be added. Students should check with the department before each term.

**515 The Politics of Technical Decisions (also Science, Technology, and Society 541, City and Regional Planning 541, and Business and Public Administration NPA 515)** Fall. 4 credits.

W 2:30–4:30. D. Chubin.  
This is a seminar dealing with the relationship between knowledge and power, between technology and democratic political institutions in modern society. Our focus will be on decision making in areas often defined as "technical" and best resolved by experts. We shall examine the origins of "technocratic politics," the politics of expertise, and the questions of political versus professional control that are raised by controversial technology choices. Our central concern will be the clash between technological and democratic values.

**521 Macro Organizational Behavior (also Industrial and Labor Relations 521)** Spring. 3 credits.

Hours to be arranged. R. Stern.  
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.

**523 Analysis of Data with Measurement Error** Fall. 4 credits. Prerequisite: Sociology 424 or equivalent. Not offered 1983–84.

Hours to be arranged. Staff.  
Multivariate statistical methods with explicit treatment of measurement error. Classical test theory, path analysis of unmeasured variables, econometric "errors-in-variables" models, confirmatory factor analysis, and Joreskog's general model for estimating linear structural relations (LISREL). Introduction to latent structure analysis. Emphasis on applications.]

**531 Population Policy (also Biology and Society 401)** Spring. 4 credits. Prerequisite: graduate standing or permission of instructor.

W 2:30–4:30. J. M. Stycos.  
The ways in which societies try to affect demographic trends. Special focus is on government policies and programs to reduce fertility.

**541 Sociological Theory** Fall. 4 credits. Prerequisite: graduate standing or permission of instructor.

M W 1:25–3:20. R. M. Williams, Jr.  
Contemporary and classical theories, including Durkheim, Marx, Weber, and Parsons. Systematic review of theory and research, with emphasis on

substantive knowledge and testable hypotheses. Subjects included are social processes, social structures, cultural content, and social and cultural change. Attention is given to the nature and size of the social system (small groups, communities, large organizations, societies) and also to both macro- and micro-social processes and properties (integration, authority, conformity, and deviance).

**[585 Social Structure and Personality (also Psychology 585)]** Fall. 4 credits. Not offered 1983–84.

R 2:30–4:25. B. C. Rosen.

An analysis of the ways in which social and psychological factors interact to affect the development of personality, the rates of individual and group behavior, and the functioning of social systems.]

**601 Southeast Asia Seminar: Malaysia (also Asian Studies 601)** Fall. 4 credits.

R 3:30–5:30. C. Hirschman.

Survey of Malaysian society from prehistory to the present, with emphasis on political, economic, and social change of the nineteenth and twentieth centuries. Among the topics to be considered in an historical perspective are the plural society, colonial rule and its legacy, the export economy and immigrant labor, Malay social structure, the "Emergency," postindependence politics and parties, economic planning and the New Economic Policy, and demographic changes. Students will write research papers.

**[603 Seminar: Marx, Durkheim, Weber]** Fall. 4 credits. Not offered 1983–84.

T 2:30–4:30. J. Kahl.]

**624 Advanced Methods of Epidemiology (also Veterinary Medicine 665)** Fall. 4 credits.

T R 3:30–5. B. Edmonston.

This course will emphasize knowledge essential for epidemiologic research. It will cover key issues in the planning, management, analysis, and interpretation of epidemiologic research. These topics include design options; sampling strategies; measures of disease frequency and association; risk assessment; validity; selection; information and misclassification bias; confounding interaction and effect modification; stratified analysis; matched analysis; and application of multivariate statistical modeling (including logistic and survival analysis). This course will prepare students to appreciate and conduct epidemiologic research.

**625 Analysis of Published Research in Organizational Behavior (also Industrial and Labor Relations 725)** Fall. 3 credits. Prerequisite: one year of statistics and permission of instructor.

W 1:30–4:30. R. Stern.

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.

**627 Work and Industrial Conflict (also Industrial and Labor Relations 727)** Spring, weeks 8–14. 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, and economic causes of industrial conflict. Forms of conflict to be studied include strikes, turnover, absenteeism, and sabotage. Some discussion of the implications of various types of worker management of firms for industrial conflict will be included.

**632 Research Seminar in Population (also Rural Sociology 771)** Spring. 4 credits.

T 2:30–5:30. B. Edmonston.

**[646 Seminar: Social Stratification]** Spring. Not offered 1983–84.

R 2:30–4:30. J. Kahl.]

**658 The Course of Life: Developmental and Historical Perspectives (also Human Development and Family Studies 686)** Spring. 3 credits.

Enrollment limited to 15. Prerequisite: permission of instructor. S-U grades optional. College of Human Ecology students must register for HDFS 686.

Hours to be arranged. G. Elder.

An introduction to the life course as a theoretical orientation, methodology, and field of study. Special emphasis is devoted to multidisciplinary convergence on life course problems; to theory and research on the interaction of social, psychological, and biological processes from birth to death; and to historical influences.

**670 Community, Housing, and Local Political Processes (also Consumer Economics and Housing 670)** Spring. 3 credits. S-U grades optional. Offered alternate years.

T 1:25–4:25. A. Shlay.

A seminar directed at establishing linkages between the organization of space, political power, and social welfare. Part one examines theoretical and empirical perspectives on power, community power, models of residential differentiation, and political outcomes. Part two examines the politics of metropolitan organization and the linkages between spatial form, social reproduction, and social control. Part three works towards defining the parameters whereby community (spatially proximate people) is or can become a viable arena for social change.

**[671 Power, Participation, and Public Policy (also Consumer Economics and Housing 671)]** Spring. 3 credits. S-U grades optional. Offered alternate years. Not offered 1983–84.

T 1:25–4:25. A. Shlay.

This course explores the sources of American political stability by concentrating on the ways in which political power and participation are managed within the public policy arena. The first part of the course focuses on competing theories of political stability and legitimacy. The second part focuses on political processes and modes of political action. The third part examines power structuration, focusing on the empirical work that looks at the link between the activity of power wielding and class structure.]

**677 Seminar in Field Research (also Industrial and Labor Relations 677)** Spring. 3 credits. Enrollment limited. Prerequisite: permission of instructor.

M W 12:20–1:35. H. Trice.

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.

**[683 Social Interaction (also Psychology 683)]** Spring. Not offered 1983–84.

Hours to be arranged. D. Hayes, L. Meltzer.]

**[685 Sex Differences and Sex Roles (also Psychology 685 and Women's Studies 685)]** Fall. 4 credits. Not offered 1983–84.

Hours to be arranged. S. Bem.]

**691–692 Directed Research** Fall or spring. Up to 4 credits, to be arranged. Prerequisite: permission of instructor.

**695 Thesis Research** Fall or spring. Up to 6 credits, to be arranged. Prerequisite: permission of thesis director.

## Related Courses in Other Departments

Students interested in sociology should also consult the lists of the following 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). A comprehensive list of all sociology courses offered throughout the University may be obtained at the Sociology Department office, 316 Uris Hall.

## Swahili

See Africana Studies and Research Center, p. 199.

## Tagalog

See Modern Languages, Literatures, and Linguistics, p. 168.

## Tamil

See Modern Languages, Literatures, and Linguistics, p. 169.

## Telugu

See Modern Languages, Literatures, and Linguistics, p. 169.

## Thai

See Modern Languages, Literatures, and Linguistics, p. 169.

## Theatre Arts

### Drama, Dance, Film

D. L. Fredericksen, chairman; R. Archer, V. A. Becker, S. R. Cole (on leave), P. J. Curtis, R. Dressler, C. Feck (visiting), R. Gross, M. Hays, M. Lawler, J. Morgenroth, S. Perkins, M. Rivchin, P. Saul (dance administrator, Helen Newman Hall), R. C. Shank, J. Thorp, G. Toutiatis (visiting), A. Van Dyke, J. Viscomi (visiting), S. Williams (director of undergraduate studies)

Through its courses and production laboratories, the department provides students with a wide range of opportunities in drama, dance, and film. It offers a major in theatre arts with a concentration in drama or film, and a major in dance. These majors provide students with an education in theatre, dance, and film that is in accordance with the general liberal arts ethic of the college, and they also provide some measure of preprofessional training in these arts. The department also provides the Cornell community with opportunities to participate in productions on an extracurricular basis.

### Theatre Arts Major

Prerequisites for admission to the major (to be completed by the end of the sophomore year):

- 1) Theatre Arts 230.
- 2) Either Theatre Arts 250 or 280.
- 3) A grade of C or better in the above courses.
- 4) Consultation with the department's director of undergraduate studies.

### Drama Concentration

The requirements for the drama concentration have been reformulated for students in the class of 1985 and beyond. Students in the class of 1984 are to follow the old requirements but should note the fact that the content of certain theatre history courses no longer corresponds to previous catalog descriptions under the same number. For clarity, major requirements for the classes of 1984, 1985, and beyond are listed separately below.

#### Requirements for the class of 1984:

- 1) Theatre Arts 240, 250, 280.
- 2) A minimum of four laboratory courses chosen from Theatre Arts 151, 155, 251, 351, and 451. At least one term of 151 and 155 must be taken. At least one laboratory course a year must be taken in the junior and senior years.
- 3) Two courses in theatre studies chosen from Theatre Arts 325, 326, 327, 331, 332, 333, 334, 335, 336, 431, 432, 433, 434, and 435.
- 4) Four courses (at least 12 credits) in other departmental courses, chosen in consultation with an adviser.
- 5) Two courses in related areas outside the department, chosen in consultation with an adviser.
- 6) Courses in which a student receives a grade below C cannot be used to fulfill the requirements for the major.

**Requirements for the class of 1985:** Majors in the class of 1985 are to fulfill the requirements for the majors in the class of 1986 and beyond, with the exception of Theatre Arts 230. For the class of 1985, Theatre Arts 240 will substitute for Theatre Arts 230. The full requirements aside from that substitution are given below, under the requirements for class of 1986 and beyond.

#### Requirements for the class of 1986 and beyond:

- 1) Theatre Arts 230, 250, 280.
- 2) Four laboratory courses distributed as follows: one run-crew experience (151), one stage management experience (153), one acting or dance experience (155), one advanced crew or second run-crew in a different area (151, 251, 351 or 451).
- 3) Four courses in theatre studies, chosen in the following manner: one course from Theatre Arts 325, 326, 327; one course from Theatre Arts 331, 332, 333; one course from Theatre Arts 334, 335, 336; one course from Theatre Arts 431, 432, 433, 434 and 435.
- 4) Four courses (at least 12 credits) in other departmental courses, chosen in consultation with an adviser.
- 5) Two courses in related areas outside the department, chosen in consultation with an adviser.
- 6) Courses in which a student receives a grade below C cannot be used to fulfill the requirements for the major.

### Film Concentration

Requirements:

- 1) Theatre Arts 230 or 240, along with 250 and 280.
- 2) Theatre Arts 374 with a grade of C+ or better.
- 3) 16 credits in film that include:
  - a) two courses chosen from Theatre Arts 375, 376, 378, and 379;
  - b) Theatre Arts 377;
  - c) either Theatre Arts 475 or 477.
- 4) 8 credits in other theatre arts courses.
- 5) 12 additional credits of related work outside the department.
- 6) An average of C+ or better in all theatre arts courses.

### The Dance Program

In addition to courses in composition, history, and movement sciences, courses in dance technique are offered each semester: four levels of modern and three of ballet. Registration takes place in Teagle Hall. Technique classes are intended to develop strength, flexibility, coordination, and the ability to perceive and reproduce phrases of dance movement with rhythmic accuracy, clarity of body design, and fullness of expression. The more advanced classes require the mental, physical, and emotional flexibility to perform more complex phrases in various styles. T'ai Chi, a Chinese system of movement for health, self-defense, and meditation, and other dance styles and forms such as jazz, Japanese Noh, and Indian and Javanese dance are offered on a rotating basis. Students may satisfy the physical education requirement by taking any of these courses. Up to four academic credits may be earned (one each semester) for enrollment in intermediate or advanced technique only (see Theatre Arts 304, 306, 308). The schedule for technique classes is available in the Dance Office, Helen Newman Hall.

Students may receive credit for performance in student-faculty concerts by enrolling in Theatre Arts 155. Repertory and performance workshops are offered in which staff choreograph and conduct rehearsals for performance of original dance works. Admission is with permission of the instructor. Hours are arranged through the Dance Office, Helen Newman Hall. One academic credit (S-U grades only) may be earned for such work.

#### Dance Major

The dance program is housed in Helen Newman Hall. To be admitted to the major, students must have completed or shown competence in intermediate modern technique by the beginning of the junior year.

Requirements:

- 1) A minimum of one technique class each term chosen from Theatre Arts 304, 306, or 308, one credit each term for four terms.
- 2) Theatre Arts 210, 211, 312, 314, and 315.
- 3) 20 additional credits in related fields chosen in consultation with advisers.

### Departmental Honors Program

Candidates for the degree of Bachelor of Arts with honors in theatre arts must fulfill the requirements of the major and maintain an average of B+ in departmental courses and an average of B in all courses. Any such student may, at the beginning of the second semester of the junior year, form a committee of three faculty members to guide and evaluate the honors work. The work will culminate in an honors thesis or practicum to be presented not later than April 1 of the senior year and an examination to be held not later than May 1.

### Theatre Colloquium

On announced dates during the year, the entire department—faculty, undergraduate and graduate students—meets on Fridays, 12:20–2:00 p.m. in 101 Lincoln Hall. These sessions, which take the form of guest lectures, research presentations, and critiques of major Theatre Cornell productions, are designed to encourage an understanding of the integration of all components of theatre in its various forms.

### Theatre Laboratories

Theatre Cornell, the department's producing organization, annually presents a season of classic and modern dramas, dance concerts, and experimental theatre. This organization functions as the department's principal laboratory for developing actors, directors, dancers, playwrights, designers, technicians, stage managers, and arts administrators.

Production experiences are under the direct supervision of the department's staff and are organized into laboratory courses according to the skill and level of involvement. Students may register for the laboratories most appropriate for their participation.

- 1) Design and technology laboratories: Students may enroll either term in Theatre Arts 151, 153, 251, 351, or 451. These courses progress from elementary crew participation to full design, technical, and stage management assignments. Laboratories should be taken concurrently with allied content courses.
- 2) Rehearsal and performance laboratory: Students may enroll in Theatre Arts 155, 751, or 752 after being assigned roles through auditions in theatre or dance productions.

All production laboratory courses listed above may be repeated for credit and may be added without penalty at any time during the term with the permission of the instructor. Students are also encouraged to participate in Theatre Cornell productions at any time on an extracurricular noncredit basis.

### Film Study Abroad

The College of Arts and Sciences, through this department and in consort with seventeen 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 an independent major in film studies and serves as an intensive supplement to their Cornell film courses. Fluency in French is required, and Theatre Arts 374, 375, and 376 are prerequisites. Inquiries should be addressed to Professor Fredericksen, Cornell's liaison with the center.

### Scholarship

The Charles B. Moss Scholarship is administered by the department. The recipient is chosen from among those majors in the department who demonstrate exceptional ability.

### Freshman Seminar Requirement

The Freshman Seminar requirement may be satisfied by Theatre Arts 108 or 140.

### Freshman Seminars

**108 Writing about Film (also English 108)** Fall and spring. 3 credits.

T R 12:20–1:35. H. Knode.

This course is meant to serve not as an introduction to film analysis, but as a writing seminar that takes cinema as its primary object of attention. Students will view a wide range of popular and art films. They will be required to attend a two-hour screening outside of class approximately once a week. The writing requirement comprises five papers averaging five pages in length, and eight to ten short writing assignments. No familiarity with film history of analysis is expected.

**140 From Script to Stage: Writing about the Theatrical Process** Fall or spring. 3 credits.

Sec 1, M W F 9:05; sec 2, fall only, M W F 1:25.

Bradley, J. Visconti.

In this course students will explore and write about the process through which drama becomes theatre: how the methods of playwright, actor, director, and designer dovetail to create the theatrical piece. Students will be asked to apply the rhetorical strategies of theatre to their own essay writing. Texts will include Theatre Cornell productions.



## Acting

**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 semester in which credit is earned; requests for credit afterwards 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.

**280 Introduction to Acting** Fall or spring. 3 credits. Each section limited to 16 students. Registration only through department roster in 104 Lincoln Hall.

Sec 1, T R 2:30–4:25 (primarily for prospective majors and those interested in extended study of acting), A. Van Dyke; sec 2, M W 10:10–12:15, T. Cronin; sec 3, T R 12:20–2:15, C. Marcroft; sec 4, T R 12:20–2:15, H. Palmer; sec 5, T R 12:20–2:15, M. Nesbitt; sec 6, T R 12:20–2:15, J. Lynch; sec 7, T R 12:20–2:15, staff.

Introduction to the problems and techniques of acting through history, theory, and practice. Appreciation of the actor's function as a creative artist and social interpreter through selected readings, lectures, and play attendance. Examination of the actor's craft through improvisation and exercises in physical, emotional, and intellectual skills.

**281 Acting I—Basic Technique** Fall or spring. 3 credits. Each section limited to 14 students. Prerequisites: Theatre Arts 280 and audition. Registration only through department roster in 104 Lincoln Hall.

Sec 1, M W 2:30–4:25, A. Van Dyke; sec 2, M W 10:10–12:05, J. Thorp.

Practical exploration of the actor's craft through improvisation, exercises in physical and psychological action; problems in the use of imagination, observation, and research as tools for exploring the script.

**282 Introduction to Voice and Speech for Performance** Fall. 2 credits. Limited to 12 students. Primarily for department majors. Registration only through department roster in 104 Lincoln Hall.

M W 8:05–9:55. Staff.  
Study and practice in the correct physical use of the voice through exercises in relaxation, alignment, breath control, support, and freedom in exploring range and resonance potential.

**283 Voice and Speech for Performance** Spring. 2 credits. Limited to 12 students. Primarily for department majors. Prerequisite: Theatre Arts 282. Registration only through department roster in 104 Lincoln Hall.

M W 8:05–9:55. Staff.  
Development of vocal technique with additional emphasis on articulation and basics of standard American pronunciation.

**380 Acting II—Characterization** Fall or spring. 3 credits. Limited to 12 students. Prerequisites: Theatre Arts 281 and permission. Registration only through department roster in 104 Lincoln Hall.  
T R 10:10–12:05. Fall, G. Toulaitos; spring, staff.  
Scene study and improvisational work designed to develop consistency in the student's use of communicative action and emotional support in creating a role. Emphasis on text analysis, use of imagery in handling dramatic language, and exercises in emotional and sense memory.

**381 Acting III—Styles** Fall. 3 credits. Limited to 10 students. Prerequisites: Theatre Arts 380 and permission. Registration only through department roster in 104 Lincoln Hall.  
T R 10:10–12:05. J. Thorp.

Practice and application of skills and methods to various styles of dramatic literature; practical exploration of historical and social influences as determinants of style.

**575 American Mime Orientation I** Fall. 2 credits. Prerequisite: Theatre Arts 280. Students enrolled in American Mime must contact the Department of Theatre Arts about supplies one month before the beginning of classes. Registration only through department roster in 104 Lincoln Hall.

F 2–4:25. P. Curtis and other teachers from the American Mime Theatre.  
American Mime is a unique performing art created by a particular balance of playwriting, acting, moving, pantomime, and theatrical equipment. It is a complete theatre medium defined by its own aesthetic laws, terminology, techniques, script material, and teaching methods, in which nonspeaking actors, in characterization, perform the symbolic activities of American Mime plays through movement that is both telling and beautiful.

**576 American Mime Orientation II** Spring. 2 credits. Prerequisite: Theatre Arts 575 or permission of instructor. Registration only through department roster in 104 Lincoln Hall.

F 2–4:25. P. Curtis and other teachers from the American Mime Theatre.  
A continuation of Theatre Arts 575.

**701 Stage Movement and Combat** Fall and spring. 2 credits each semester. May be repeated for credit. Limited to students in M.F.A. professional actor training.

M–F 9:05–10:30. Staff.  
Development of the physical body for expression through various techniques and practice, including effort-shape; improvisation; composition; modern dance and ballet; period dance; stage combat technique in foil, epee, sabre, and dagger; tumbling; aikido and stage fighting; combat choreography.

**730 Dramatic Text Analysis** Fall and spring. 2 credits each semester. May be repeated for credit. Limited to students in M.F.A. professional actor/director training program. Others by permission of instructor.

M W 1–2:30. Fall, R. Shank; spring, staff.  
An examination of selected works of dramatic literature for theatre artists. Intensive study of the play's text for techniques in interpretation, character development, plot articulation, and the aesthetics of prose and poetry for performance.

**751 Rehearsal and Performance** Fall. 2 credits. May be repeated for credit. Limited to students in M.F.A. professional actor training.

Staff.  
Study, development, and performance of assigned roles.

**752 Rehearsal and Performance** Spring. 2 credits. May be repeated for credit. Limited to students in M.F.A. professional actor training.

Staff.  
Study, development, and performance of assigned roles.

**780 Acting Technique I** Fall and spring. 2 credits each semester. Limited to students in first-year M.F.A. professional actor/director training.

M W 2:45–4:25, T R 2:30–4:25. Fall: G. Toulaitos; spring, staff.  
Study and practice of fundamental techniques and methods. Exploration and use of the basic dynamics of the actor's organism.

**781 Acting Technique II** Fall and spring. 2 credits each semester. Limited to students in second-year M.F.A. professional actor training. Prerequisite: Theatre Arts 780.  
M W 2:45–4:25, T R 2:30–4:25. J. Thorp.  
Development and integration of the personal dynamic into the total acting process.

**782 Voice Technique I** Fall and spring. 2 credits each semester. Limited to students in the first-year M.F.A. professional actor/director training.

M W F 10:45–12, T R 1–2:15. Staff.  
Emphasis on correct use of the vocal instrument through exercises designed to achieve the freedom, flexibility, control, and power required for the professional actor.

**783 Voice Technique II** Fall and spring. 2 credits each semester. Limited to students in second-year M.F.A. professional actor training. Prerequisite: Theatre Arts 782.

T R 10:45–12. Staff.  
Practice, development, and expansion of work presented in Theatre Arts 782. Use of text to explore vocal action and voice as an integral part of developing characterization.

**784 Speech Technique I** Fall and spring. 2 credits each semester. Limited to students in first-year M.F.A. professional actor/director training.

T R 10:45–12. A. Van Dyke.  
Ear training; sound designation of vowels, consonants, and diphthongs through exercises; sound symbolization through use of the International Phonetic Alphabet (IPA); eradication of regionalisms; development of standard American speech.

**785 Speech Technique II** Fall and spring. 2 credits each semester. Limited to students in second-year M.F.A. professional actor training. Prerequisite: Theatre Arts 784.

M W 10:45–12. A. Van Dyke.  
Refinement of sound distinction and execution; study of dramatic texts in prose and poetry to develop techniques in scansion, emphasis, rhythm, range, and melody.

## Film

**[374 Introduction to Film Analysis: Meaning and Value]** Summer or fall. 4 credits. Not offered fall 1983; next offered summer 1984.

T R 10:10–11:30. D. Fredericksen.  
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 types.]

**[375 History and Theory of the Commercial Narrative Film]** Fall. 4 credits. Not offered 1983–84; next offered 1984–85. Fee for screening expenses, \$10 (this fee is paid in class).

T R 2–4:25. D. Fredericksen.  
Consideration of the broad patterns in the history of the commercial narrative film, viewed as an artistic medium and as a system requiring the massive consumption of artifacts. Emphases include the early articulation of a cinematic language, realism as an artistic style, the nature and functions of popular film, and modernism. Major figures include Griffith, Eisenstein, Murnau, Von Stroheim, Dreyer, Chaplin, Renoir, Ford, Hitchcock, Welles, Antonioni, Fellini, Bergman, Bunuel, Resnais, Godard, and Herzog.]

**376 History and Theory of Documentary and Experimental Film** Fall. 4 credits. Fee for screening expenses, \$10 (this fee is paid in class).

T R 2–4:30. D. Fredericksen.  
Documentary figures covered include Vertov, Flaherty, Grierson, Ivens, Lorentz, Riefenstahl, Capra, and Jennings. Within the history of the experimental and personal film, emphases are the avant-garde of the twenties, the movement toward documentary in the thirties, and American experimental and personal film from the forties to the present.

**377 Fundamentals of 16-mm Filmmaking** Fall or spring. 4 credits. Limited to 12 students. Prerequisite: permission of instructor. Fee for maintenance costs, \$25 (this fee is paid in class). The average cost to each student for materials and processing is \$200.

M W F 2–4:25. M. Rivchin.

The mechanics and expressive potential of 16-mm filmmaking, including nonsynchronous sound. Each student completes four short film exercises and a longer, sound film which will be screened publicly. Students retain ownership of all films they produce. No prior filmmaking experience is assumed.

**[378 Russian Film of the 1920s and French Film of the 1960s]** Spring. 4 credits. Prerequisite: Theatre Arts 375. Not offered 1983–84; next offered 1984–85. Fee for screening expenses, \$10 (this fee is paid in class).

T R 2–4:30. D. Fredericksen.  
An intensive treatment of two distinct periods of innovation in film theory and history. Emphasis on the relationship between theory and practice. Major figures include Eisenstein, Pudovkin, Vertov, Dovzhenko, Godard, Truffaut, Resnais, Robbe-Grillet, Eustache, Rivette, and Bresson.]

**[379 International Documentary Film from 1945 to the Present]** Spring. 4 credits. Prerequisite: Theatre Arts 376. Not offered 1983–84; next offered 1985–86. Fee for screening expenses, \$10 (this fee is paid in class).

T R 2–4:30. 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, and revolutionary documentary of the Third World.]

**475 Seminar in the Cinema I** Spring. 4 credits.  
T R 2–4:30. D. Fredericksen.  
Topic for 1984: The National Film Board of Canada (NFB). By most accounts, the NFB is the most successful government-subsidized filmmaking institution among the Western democracies, and especially in the area of documentary film. Extended consideration of the history of the NFB from its inception under Grierson to the Challenge for Change program and its aftermath.

**477 Intermediate Film Projects** Spring. 4 credits. Limited to 4 students. Prerequisites: Theatre Arts 377 or equivalent, and permission of instructor. Fee for maintenance costs, \$25 (this fee is paid in class). The average cost to each student for materials and processing is \$200; students retain ownership of their films.

M W 10:10–12:05. M. Rivchin.  
The development and completion of individual projects, with emphases on personal and documentary modes. Includes preparation of an original script or storyboard, direction, cinematography, synchronous-sound recording, editing, and follow-through to a composite print.

**653 Myth onto Film (also Anthropology 653)** Fall or spring. 4 credits. Open to undergraduate and graduate students with permission of the instructor. Prerequisite: some knowledge of any one of the following: anthropology, film, graphics, drawing, and painting.

T 1:25–4:25. 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 camerless 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.

## Inter-University Center for Film and Critical Studies in Paris

Cornell is part of a consortium supporting the center. Cornell students may earn full Cornell credit for study at the center. For course listings and other information, students should contact Professor Don Fredericksen, 104 Lincoln Hall.

## Dance

**155 Rehearsal and Performance** Fall and spring 1–2 credits; 1 credit per production experience per term up to 2 credits per term. Students must register for this 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.

**200 Introduction to Dance I** Fall. 3 credits.  
Concurrent enrollment in a dance technique class at the appropriate level is required. Registration only through department roster in 302 Helen Newman Hall.

T R 12:20–1:50. C. Feck.  
Movement improvisation and composition, readings in dance aesthetics and twentieth-century dance history. Films and videotapes are used.

**201 Introduction to Dance II** Spring. 3 credits.  
Prerequisite: Theatre Arts 200 or permission of instructor. Concurrent enrollment in a dance technique class at an appropriate level is required. Registration only through department roster in 302 Helen Newman Hall.

T R 12:20–1:50. P. Saul.  
Continuation of Theatre Arts 200.

**210 Beginning Dance Composition and Music Resources** Fall or spring. 4 credits. Prerequisites: Theatre Arts 200 or 201 or permission of instructor. Prerequisites for dance majors only: Music 141. Concurrent enrollment in a technique class at the appropriate level is required. Registration only through department roster in 302 Helen Newman Hall.

M W 6:30–8 p.m. J. Morgenroth, D. Borden.  
This course is designed to develop resources in movement and in music as it relates to dance. Students will prepare studies concerned with use of space, time, body design, and dynamics. Various approaches to the structuring of these elements will be the basis for the study of form as it applies to dance and music.

**211 Beginning Dance Composition and Music Resources** Fall or spring. 4 credits. Prerequisite: Theatre Arts 200, 201, and 210.

M W 6:30–8 p.m. J. Morgenroth, D. Borden.  
Continuation of Theatre Arts 210.

**304 Ballet III (also Physical Education 134)** Fall or spring. 1 credit. May be repeated for up to 4 credits. Prerequisite: Physical Education 431 or permission of instructor.

M W F 2:30–4. P. Saul.  
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.

**306 Modern Dance III (also Physical Education 136)** Fall or spring. 1 credit. May be repeated for up to 4 credits. Prerequisite: Physical Education 432 or permission of instructor.

M W F 4:40–6:10. J. Morgenroth.  
Study and practice of training exercises and movement phrases in a modern dance vocabulary; work is done on strengthening the body and using it as an expressive instrument.

**307 Asian Dance and Dance Drama (also Asian Studies 307)** Fall. 3 credits. May be repeated for credit.

M W F 1:25–2:10. Urip Sri Maeny and staff.  
[Section 1: Indian Dance. Not offered 1983–84. Section 2: Japanese Noh Theatre. Not offered 1983–84.] Section 3: Indonesian Dance Theatre. Readings, lectures, and practice sessions in Indonesian dance. On Fridays there will be lectures, demonstrations, and discussions on the histories and choreographies of several traditions of dance and dance drama in Indonesia. Videotapes and films will be shown. The Monday and Wednesday classes will consist of lessons in dance and will focus on performance of Javanese styles from repertoires of solo and group dances and dance dramas. These sessions will begin with the basic vocabulary of movement and proceed to the specific dances. No previous experience in dance is necessary.

**308 Modern Dance IV (also Physical Education 138)** Fall or spring. 1 credit; may be repeated for up to 4 credits. Prerequisite: Theatre Arts 306 or Physical Education 436 or permission of instructor.  
T R 4:40–6:10. Staff.

Continuation of Theatre Arts 306.

**310 Advanced Dance Composition** Fall or spring 4 credits. Prerequisite: Theatre Arts 210 or 211. Hours to be arranged. Staff.  
Further problems in composition for groups.

**312 Physical Analysis of Movement** Fall 3 credits.

T R 1:25–2:50. J. Morgenroth.  
This course is an examination of human movement with particular attention to dance movement. Readings in *The Structure and Function of Man*, by Jacob, Lossow, and Francine, will be supplemented by laboratory work in movement analysis.

**314 History of Dance I** Fall. 3 credits.  
T R 3:05–4:35. C. Feck.

A survey of the history of dance from ancient times to the Renaissance, with emphasis on the development of theatrical forms in Western civilization.

**315 History of Dance II** Spring. 3 credits.  
Hours to be arranged. P. Lawler, J. Morgenroth.  
A survey of the history of Western theatrical dance from the Renaissance to contemporary times.

**[318 Historical Dances]** Spring. 2 credits. Prerequisite: Ballet II or Modern Dance II. Not offered 1983–84.

M W F 9–10:30. M. Lawler.  
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.]

**410 Individual Problems in Composition** Fall or spring. 3 credits. Prerequisite: Theatre Arts 310 or permission of instructor.

Hours to be arranged. Staff.  
Individual problems in composition.

**[418 Seminar in History of Dance]** Spring. 3 credits. Prerequisite: Theatre Arts 315 or permission of instructor. Not offered 1983–84.]

## Directing

**398 Directing I** Fall. 3 credits. Prerequisites: Theatre Arts 250, 280, and permission of instructor.  
M W 2:30–4:25. R. Shank.

An exploration of the role of the director through study and exercises; the process of conceptualization and use of visual, temporal, and dramatic values for interpretation of the script; directorial text analysis; applied projects.

**498 Directing II** Spring. 4 credits. Prerequisite: Theatre Arts 398 or permission of instructor.

M W F 2:30–4:25. R. Shank.

Use of movement and space; character development techniques; rehearsal process; production procedures; applied project in performance.

**499 Projects in Directing** Fall or spring. 1–4 credits. Prerequisite: permission of instructor. This course may be added at any time during the term without penalty.

R. Shank.

The planning and execution of directing projects by advanced students in the public performance facilities of the Department of Theatre Arts or by those assigned assistant directing in the Theatre Cornell season.

**698 Directing Technique** Fall and spring. 4 credits each semester. Limited to students in the M.F.A. professional director training; others by permission of instructor.

T R 12:20–2:15. R. Shank.

Approaches to directorial controls for text, actors, time, structure, movement, space, and design, towards the development of a production concept from script to stage to audience. Practicums include work with actors, assistant director assignments, and the directing of complete short works.

**798 Form and Style in Directing** Fall and spring 4 credits each semester. Limited to students in the M.F.A. professional director training; others by permission of instructor.

R. Shank.

An exploration of major dramatic forms through analytical, interpretative, psychological, and technical methods for the director's realization of inherent values towards a coherent production style. Practicums include the direction of full-length works each term.

## Theatre Design and Technology

**151 Production Laboratory I** Fall or spring. 1–2 credits. May be repeated for credit. Orientation meeting in Willard Straight Theatre at 7:30 p.m. on the second day of classes.

Staff.

Instruction and practice at the introductory level on the basic techniques of construction and operation of scenery, costumes, lighting, and sound. Instruction is supervised by the design/technology faculty and is directed towards the production of plays for the Theatre Cornell season.

**153 Stage Management Production Laboratory** Fall and spring. 1–3 credits. May be repeated for credit. Orientation meeting in Willard Straight Theatre at 7:30 p.m. on the second day of classes.

Staff.

Practical production experience and specific responsibility—on all levels—in stage management assignments on department productions. Theatre Arts 370 complements this course. Guided and supervised by appropriate faculty on individual productions.

**250 Fundamentals of Theatre Design/Technology** Fall or spring. 4 credits. Not offered to first-term freshmen.

Lec-lab, M W F 2:30–4:25. Staff.

An introduction to design and technical experience in the theatre, with particular attention to the unique collaboration of director, designer, and technician. Lectures, discussions, and extensive project work will relate the visual principles of designing scenery, costumes, and lighting to the production techniques by which designs are realized on the stage. This course is prerequisite to all higher-level courses in design and technology for the theatre.

**251 Production Laboratory II** Fall or spring. 1–3 credits. May be repeated for credit. Prerequisite: Theatre Arts 151 or permission of instructor.

Orientation meeting in Willard Straight Theatre at 7:30 p.m. on the second day of classes.

Staff.

Practical production experience that involves specialized instruction and specific responsibilities in positions such as light-board operator, wardrobe mistress, and set or properties-crew head. There is also preparatory work in specific areas of more advanced construction in scenery, costumes, lighting, and sound. Instruction and practice is supervised by the design/technology faculty and is directed towards the production of plays for the Theatre Cornell season.

**260 Visual Concepts for the Theatre** Fall. 3 credits.

T R 12:20–2:15. V. Becker.

A studio examination of the visual expression of ideas and concepts that focuses on developing the creative design process. Begins with the translation of simple thoughts and emotions into the visual language by which a designer can communicate with an audience. Concentrates on practical application of this process to the complex objectives of design and directing in the theatre.

**261 Production Concepts for the Theatre** Fall. 3 credits.

M W 12:20–2:15. R. Archer.

A studio-examination of the physical expression of environment within the theatre, which focuses upon the personal understanding and application of spatial and structural concepts. Material, scale, proportion, texture, and other elements are explored as techniques for achieving the design and technical objectives of theatre production.

**351 Production Laboratory III** Fall or spring. 1–3 credits. May be repeated for credit. Prerequisite: Theatre Arts 251 or permission of instructor.

Orientation meeting in Willard Straight Theatre at 7:30 p.m. on the second day of classes.

R. Dressler.

Practical production experience that offers an opportunity for advanced positions in design and/or technology. These include full responsibility for an aspect of a smaller production, major responsibilities as an assistant on a major production, or significant responsibilities as major crew head. All work is guided and supervised by appropriate faculty and is an active part of the Theatre Cornell season.

**362 Lighting Design and Technology** Fall.

4 credits. For both majors and qualified nonmajors in related fields. Prerequisite: Theatre Arts 250 or permission of instructor.

T R 10:10–12:05. R. Dressler.

An exploration of the role of light as an expressive design medium for the interpretation of plays in the theatre. Will explore the visual nature and dramatic impact of light, the design process and its associated communication techniques, and lighting practices in the professional theatre.

**364 Scene Design and Technology** Spring.

4 credits. For both majors and qualified nonmajors in related fields. Prerequisite: Theatre Arts 250 or permission of instructor.

M W 12:20–2:15. R. Archer, V. Becker.

A study of the basic problems of design and technology of scenery for the stage. Will explore the design process, use of research and imagery, techniques of design communication, and materials and associated tools for the realization of designs on the stage.

**366 Costume Design/Technology** Spring.

4 credits. For both majors and qualified nonmajors in related fields. Prerequisite: Theatre Arts 250 or permission of instructor.

T R 12:20–2:15. S. Perkins and staff.

An introduction to costume design and technology that includes the analysis of the play and its characters, the use of period research as a source of style and construction techniques, and the

application of materials, tools, and techniques to the process by which literary characters are given visual dramatic form on the stage.

**370 Stage Management** Fall. 1 credit.

Prerequisites: Theatre Arts 240 and 250.

T 4:30–6. R. Dressler.

Introduction to the concepts and techniques of stage management as they relate to specific areas of production. Development of communication skills relevant to the role of stage manager and each area of production. Development of greater understanding of the production process as experienced in the position of stage manager or assistant.

**451 Production Laboratory IV** Fall or spring. 1–4 credits. May be repeated for credit. Prerequisite:

Theatre Arts 351 or permission of instructor. Orientation meeting in Willard Straight Theatre at 7:30 p.m. on the second day of classes.

R. Dressler.

Practical production experience requiring full design and/or technical responsibility for an aspect of a play produced within the Theatre Cornell season. Student designer, technician, or stage manager will be assigned an appropriate faculty supervisor.

**462 Advanced Lighting Design and Technology**

Spring. 4 credits. May be repeated for credit.

Prerequisite: Theatre Arts 362 and permission of instructor.

T R 12:20–2:15. R. Dressler.

An exploration of lighting design/technology on a more advanced level, with particular stress upon project work and occasional production assignments.

**464 Advanced Scene Design/Technology** Fall.

4 credits. May be repeated for credit. Prerequisite:

Theatre Arts 364 and permission of instructor.

M W 12:20–2:15. V. Becker.

An exploration of scene design and technology on a more advanced level, with particular stress upon project work and occasional production assignments.

**466 Advanced Costume Design/Technology**

Fall. 4 credits. May be repeated for credit.

Prerequisite: Theatre Arts 366 and permission of instructor.

T R 12:20–2:15. S. Perkins and staff.

An exploration of costume design/technology on a more advanced level, with particular stress upon project work and occasional production assignments.

**550 Design Studio I** Fall. 1–6 credits.

Prerequisite: permission of instructor.

M W F 9:05–11. Staff.

Lecture and studio work in the principles of production design, for graduate students and advanced undergraduates with professional-level interest. Focuses upon the development of personal design processes for the profession.

**551 Production Laboratory V** Fall or spring. 1–6 credits. May be repeated for credit. Prerequisite:

permission of instructor.

Hours by arrangement. R. Archer, S. Perkins.

Production design, technical, or management responsibilities for graduate students.

**560 Design Techniques Studio I** Fall or spring

1–4 credits. Prerequisite: permission of instructor.

T R 9:05–12:05. Staff.

Advanced studio work in the language of design: the representation of environments for the stage in both two- and three-dimensional form. Will include selected topics in drafting, painting, perspective, and color theory.

**562 Lighting Techniques I** Fall. 4 credits.

Prerequisite: Theatre Arts 462 and permission of instructor.

T R 12:20–2:15. R. Dressler.

Lecture and studio work in the principles of lighting, for graduate students and advanced undergraduates with professional-level interest. Focuses upon professional practices and standards.

**564 Scenic Techniques I** Spring. 4 credits.

Prerequisite: permission of instructor.

M W 9:05–11. R. Archer.

Lecture and studio work in the principles of scenery, for graduate students and advanced undergraduates with professional-level interest. Focuses upon the technical and procedural practices that influence the development of a personal design process for the profession.

**566 Costume Techniques I** Spring. 4 credits.

Prerequisite: permission of instructor.

M W 9:05–11. S. Perkins.

Lecture and studio work in principles of costumes for the stage. For graduate students and advanced undergraduates with professional-level interest. Will focus upon the relationship of design to the skills by which designs are visualized and realized on the Aesthetics of theatricality.

**650 Design Studio II** Fall or spring. 1–6 credits

each semester. Prerequisite: permission of instructor.

Hours to be arranged. Staff.

Selected topics in scene design. Topic for 1983–84: History of styles of design.

**750 Design Studio III** Spring. 1–6 credits each

semester. Prerequisite: permission of instructor.

T R 10:10–12:05. Staff.

Selected topics of scene design. Topic for 1983–84: Aesthetics of theatricality.

**Theatre History, Literature, and Theory****230 Introduction to Theatre History** Spring.

3 credits.

M W F 9:05. S. Williams.

A survey of the history of the theatre from its origins to the present day. Special attention will be paid to the evolution of the theatre as a performance art and to the changing social functions of the theatre. Representative plays will be read and discussed in their theatrical context.

**240 Introduction to the Theatre** Fall, spring, or

summer. 3 credits.

M W F 11:15. Fall: R. Gross.

A survey of the elements of drama and theatre, intended to develop appreciation and rational enjoyment of the theatre in all its forms. Not a production course.

**300 Independent Study** Fall or spring. 1–4

credits; no more than 4 credits each semester. May be repeated for credit. Limited to upperclass students. Permission will be granted only to students who present an acceptable prospectus and who have secured the agreement of a faculty member to serve as supervisor for the project throughout the term. Students must submit written proposals to the department office and to the Office of Records and Scheduling along with registration forms.

**325 Classic and Renaissance Drama (also Comparative Literature 352)** Fall. 4 credits.

M W F 9:05. A. Caputi.

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, focussing 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.

**326 European Drama, 1660 to 1900 (also Comparative Literature 353)** Spring. 4 credits.

M W F 2:30. R. Gross.

Readings from major dramatists from Corneille to Chekhov, including such authors as Moliere, Congreve, Marivaux, Goldoni, Gozzi, Schiller, Kleist, Gogol, Ostrovski, and Ibsen.

**327 Modern Drama (also Comparative Literature 354)** Fall. 4 credits.

M W F 1:25. S. Williams.

Readings from major dramatists of the twentieth century, including Ibsen, Chekhov, Strindberg, Shaw, Pirandello, Ionesco, Brecht, Beckett, and contemporary American and European playwrights.

**331 The Classical Theatre** Spring. 4 credits.

Prerequisite: Theatre Arts 230 or permission of instructor.

T R 10:10–11:25. M. Hays.

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 context.

**[332 The Medieval and Renaissance Theatre**

Spring. 4 credits. Prerequisite: Theatre Arts 230 or permission of instructor. Not offered 1983–84; next offered 1984–85.

R. Gross.

A intensive study of the cultural conditions, plays, and performance situations that mark the revival of the theatre in Europe in the period between the tenth and the early seventeenth centuries. Representative plays will be read and discussed in their theatrical context.]

**[333 English and European Theatre, 1642–1800**

Fall. 4 credits. Prerequisite: Theatre Arts 230 or permission of instructor. Not offered 1983–84; next offered 1984–85.

M. Hays.

A study of theatrical styles and production modes. Topics include the English restoration and French neoclassical theatres, the European court theatre, and the rise of standing commercial theatre companies. Special focus to be placed on the theatrical work of Moliere, Goldoni, Garrick, Schrodler, and Goethe and on the designers of the Bibbiena family. Representative plays of the period will be read and discussed in their theatrical context.]

**334 Romantic and Early Modern Theatre** Fall.

4 credits. Prerequisites: Theatre Arts 230 or permission of instructor.

M W F 10:10–11. S. Williams.

A study of the development of the English and European theatre from 1800 to the early years of the modern theatre. Topics include romanticism in the theatre, the nineteenth-century commercial theatre, and the work of the independent theatre between 1887 and 1914. Special focus will be placed on the rise of the virtuoso actor and the stage director. In addition to representative plays, the theoretical writings of such figures as Hugo, Zola, Stanislavsky, Appia, and Craig will be discussed.

**[335 The Modern and Contemporary Theatre**

Spring. 4 credits. Prerequisites: Theatre Arts 230 or permission of instructor. Not offered 1983–84; next offered 1984–85.

S. Williams.

The history of theatres and theatrical productions in Europe from the early modern theatre to the present day. Special consideration will be given to such central figures as Vsevolod Meyerhold, Leopold Jessner, Bertolt Brecht, Antonin Artaud, Louis Jouvet, Wieland Wagner, Peter Brook, and Josef Svoboda. The development of ensembles such as the Royal Shakespeare Company and the Polish Laboratory Theatre will also be examined. Representative plays will be read and discussed in their theatrical context.]

**336 American Drama and Theatre** Spring.

4 credits. Prerequisite: Theatre Arts 230 or permission of instructor.

M W F 1:25. R. Gross.

A study of the American theatre and representative American plays, with emphasis on drama from O'Neill to the present.

**[337 Opera** Fall. 4 credits. Prerequisites: Theatre Arts 230 or permission of instructor. Not offered 1983–84.

S. Williams.

The same as Music 274, but with one additional meeting a week devoted to discussion of staging and theatre history.]

**348 Playwriting** Fall. 4 credits. Prerequisite: permission of instructor.

T R 2:30–3:45. R. Gross.

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.

**349 Advanced Playwriting** Fall. 4 credits.

Prerequisite: Theatre Arts 348.

R 2:30–5. R. Gross.

A continuation of Theatre Arts 348, culminating in the composition of a full-length play.

**372 English Drama (Also English 372)** Spring.

4 credits.

M W F 10:10. S. McMillin.

Important events in the English theatre from the beginning to the twentieth century. Plays by Marlowe, Shakespeare, Jonson, Webster, Dryden, Wycherly, Behn, Congreve, Sheridan, Shelley, Shaw, and others. Relationships between playhouses, dramatic texts, and politics.

**[431 Theory of the Theatre and Drama I**

Fall. 4 credits. Prerequisite: some theatre history and dramatic literature work at the 300 level or permission of instructor. Not offered 1983–84; next offered 1984–85.

S. Williams.

A study of various theories of dramatic form and theatrical presentation from Aristotle and Horace to Goethe and Schiller.]

**432 Theory of the Theatre and Drama II**

Fall. 4 credits. Prerequisite: some theatre history and dramatic literature work at the 300 level or permission of the instructor.

T R 10:10–11:25. M. Hays.

A study of various theories of dramatic form and theatrical presentation from Goethe and Schiller to the present.

**[433 Dramaturgy: Play and Period**

Spring. 4 credits. Prerequisites: some theatre history and dramatic literature work at the 300 level or permission of instructor. Not offered 1983–84; next offered 1984–85.

R. Gross.

An intensive study of the theatrical and cultural background of a play or plays being performed in the season of Theatre Cornell. The course will also include a discussion of the principles of dramaturgy, and all students will be expected to complete a dramaturgical assignment.]

**434 Theatre and Society (also English 454)**

Spring. 4 credits. Prerequisite: some theatre history or dramatic literature work at the 300 level or permission of the instructor.

T 2:30–5. S. Williams.

An examination of the role theatre has played in the social and political life of Western society. This year the subject is Irish drama. The course will be centered around the plays of Yeats, Synge, and O'Casey, though plays by minor dramatists of the Abbey Theatre, such as Lady Gregory, Colum, and Fitzmaurice will be read. Specific focus will be upon the uses theatre makes of nationalism and vice versa and upon the relationship between theatre and national myth.

**435 Special Topics** Spring. 4 credits. Prerequisite: some theatre history or dramatic literature work at the 300 level or permission of the instructor.

R 2:30–5. M. Hays.

Topic: The postmodern theatre: from Beckett to Handke.

**495 Honors Research Tutorial** Fall or spring. 1–4 credits. Prerequisites: senior standing and departmental acceptance as an honors candidate. Hours to be announced. Staff. Methods and modes of research for honors project.

**496 Honors Thesis Project** Fall or spring. 1–4 credits. Prerequisites: senior standing and departmental acceptance as an honors candidate. Hours to be announced. Staff. Preparation and presentation of honors thesis or practicum.

**633 Seminar in Theatre History** Spring. 4 credits. T 2:30–5. S. Williams. Topic: Irish-drama and theatre.

**636 Seminar in Dramatic Criticism** Fall. 4 credits. Prerequisite: permission. R 2:30–5. M. Hays. Topic: The origins of the modern drama: text and context.

**[637 Seminar in Dramatic Theory** Fall. 4 credits. Not offered 1983–84; next offered 1984–85. R. Gross.]

**672 Philosophy and Theory of Tragedy (also English 678)** Fall. W 1:25–3:20. T. Murray.

The course will reflect on the theoretical "return" of tragedy. What lies behind our critical interest in the tragic? Is our nostalgia for the tragic related to the structure of tragedy as nostalgic, historical, and psychological? As a way of understanding the history of tragical thought in literature and prose, the course will provide a selective survey of theoretical and philosophical views of tragedy as a form of poetics, materiality, law, and subjectivity. Texts will include essays by Aristotle, Burke, Girard, Nietzsche, Hegel, Lukacs, Benjamin, Lacan, Lacoue-Labarthe, Cavell, Althusser, Lyotard, and Kristeva. Although the emphasis will be on theoretical matters, discussions will touch on literary texts central to the essays under consideration.

**[699 Seminar in the Theories of Directing** Not offered 1983–84; next offered 1984–85.]

**700 Introduction to Research and Bibliography in Theatre Arts** Fall. 1 credit. Enrollment limited to students in Theatre Arts 633 or 636. Fall, R 2:30–5. M. Hays; spring, T 2:30–5. S. Williams.

A study of methods and materials relevant to the solution of problems in theatre arts, including introduction to standard research sources, problems of translation, and preparation of theses and publications.

**880 Master's Thesis**

**990 Doctoral Thesis and Special Problems**

## Related Courses in Other Departments

**The Greek Experience (Classics 211)**

**The Roman Experience (Classics 212)**

**Japanese Noh Theatre (Comparative Literature 400 and Asian Studies 400)**

**Shakespeare (English 227)**

**Introduction to Drama (English 272)**

**Shakespeare (English 327)**

**Seminar in Shakespeare (English 427)**

**Elizabethan and Jacobean Drama (English 428)**

**Contemporary American Theatre (English 455)**

**Schiller (German Literature 354)**

**German Drama after 1945 (German Literature 438)**

**Opera (Music 274, 374, and German Literature 374)**

## Ukrainian

See Modern Languages, Literatures, and Linguistics, p. 169.

## Vietnamese

See Modern Languages, Literatures, and Linguistics, p. 169.

## Special Programs and Interdisciplinary Studies

### Africana Studies and Research Center

J. Turner, director; Y. ben-Jochannan, W. Cross (director of undergraduate studies, 310 Triphammer Road, 256-4625) M. Evans, L. Edmonson, A. Graves, R. Harris (on leave 1983–84), C. Mbata, A. Nanji

The Africana Studies and Research Center has a unique and specialized program of study that offers an undergraduate degree through the College of Arts and Sciences and a graduate degree, Master of Professional Studies (African and African-American), through the University's Graduate School.

The purpose of the program is to prepare students for professional careers relevant to the learning and leadership of the African-American community. It envisions that the knowledge and methodology of various fields and disciplines will be brought to bear upon the history, present state, and dynamics of the black people and cultures in the Americas, Africa, and the Caribbean. The curriculum is designed to reflect a multidisciplinary approach to the experience of African peoples throughout the world. Africana Center courses are open to both majors and nonmajors.

### 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 Cross, 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.

**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 one of the following distribution requirements:

*Social Sciences:* AS&RC 171, 172, 190, 231, 290, 301, 302, 344, 345, 346, 351, 352, 410, 420, 460, 484, 485, 495, 550.

*History:* AS&RC 203, 204, 231, 283, 344, 350, 360, 361, 370, 381, 405, 460, 475, 483, 490.

*Humanities:* AS&RC 219, 422, 431, 432, 465, 492.

*Expressive Arts:* AS&RC 137, 138, 285, 303, 465.

*Freshman Seminars:* AS&RC 137, 138, 171, 172, 203, 204, 231, 290.

**Note:** Students who are not AS&RC majors may petition to satisfy a second requirement with center courses if they are carrying a heavy program at the center.

### 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.

**131 Swahili** Fall. 4 credits.

T W 10:10. A. Nanji.

Beginning Swahili; grammar, part 1.



**132 Swahili** Spring. 4 credits. Prerequisite: Swahili 131 or previous study of the language.

T W 12:20. A. Nanji.  
Elementary reading and continuation of grammar.

**133 Swahili** Fall. 4 credits. Prerequisites: Swahili 131 and 132.

A. Nanji.  
Advanced study in reading and composition.

**134 Swahili** Spring. 4 credits. Prerequisites: Swahili 131, 132, and 133 or permission of instructor.

A. Nanji.  
Advanced study in reading and composition.

**137 Afro-American Writing and Expression** Fall. 4 credits.

T R 10:10. A. Graves.  
Designed to promote clear and effective communication skills, using black-oriented materials as models for writing assignments and oral discussions.

**138 Applied Writing Methods on Afro-American Topics** Spring. 3 credits.

T R 10:10. A. Graves.  
A writing skills course that explores traditional and nontraditional research sources, using Afro-American experiences as the primary subject matter.

**171 Infancy, Family, and the Community** Fall 4 credits.

T R 3:10. 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.

**172 Teaching and Learning in Black Schools** Spring. 4 credits. Intended for freshmen and sophomores.

T R 3:10. W. Cross.  
A course designed for freshmen and sophomores that will be devoted to the history and contemporary issues of black education, such as the struggle for black studies, the development of independent black grammar, and the problems of public schools in black communities.

**190 Introduction to Modern African Political Systems** Fall. 4 credits.

M W 1:25-2:15. L. Edmonson.  
This course directs attention to the salient characteristics of Africa's political systems and assesses the way the systematic characteristics impinge on development efforts. It is particularly concerned with the responses of the systems of the legacy of colonially imposed constitutions, the efforts of postcolonial constitutional engineering, the creation of integrative institutions in answer to the problems of multiethnic fragmentation, the place of traditionalism in the modern political context, the locus of power in the systems, and the level of institutionalizations reached, if any, to ensure stable continuity into the future.

**202 Swahili Literature** Fall. 4 credits. Prerequisite: Swahili 134. Offered on demand.

A. Nanji.  
Students gain mastery over spoken Swahili and are introduced to the predominant Swahili literary forms.

**203 History and Politics of Racism and Segregation** Spring. 4 credits.

T R 12:20-1:25. C. Mbata.  
The patterns of racism and segregation are dealt with in a historical context, using southern Africa and North America as case histories. Study is undertaken within a theoretical framework that broadly defines racism and segregation and their implications.

**[219 Issues in Black Literature]** Fall. 4 credits. Not offered 1983-84.

An examination of literature written for black children, including an analysis of the literature as it pertains to black life from 1960 to the present. Students write a pamphlet containing their essays, fiction, and poetry and compile a bibliography of literature for black children.]

**231 Black Political Thought in the United States** Fall. 3 credits.

M W F 12:20-1:10. J. Turner.  
This is an introductory course that will review and analyze the major political formulations developed and espoused by black people in the struggle for liberation. Such themes as slave resistance, nationalism, Pan-Africanism, emigration, anti-imperialism, socialism, and the political thought of black women will be discussed. Black political thought will be viewed in its development as response to real conditions of oppression and exploitation.

**[283 Black Resistance: South Africa and North America]** Fall. 4 credits. Not offered 1983-84.

C. Mbata.  
A study of black political movements in South Africa and North America and their responses to the situations of race relations that formed the contexts of their operations.]

**285 Black Drama** Spring. 3 credits.

This course is intended to serve as an introduction to the history of black drama and to provide the means through which students can cultivate their interests in dramaturgical criticism and production techniques. Each student in the course will read a number of black plays, write a critical paper on black drama, and participate in the production of a play.

**290 The Sociology of the Black Experience** Fall 3 credits.

M W 3:10. J. Turner.  
An introductory course to the sociology of the black experience and to the field of Afro-American studies. Required for all undergraduate students majoring at the Africana Center.

**301 Seminar: Psychological Aspects of the Black Experience** Spring. 4 credits. Prerequisite: permission of instructor.

W 10:10. W. Cross.  
Existing research is used to raise specific questions about new cultural political awareness in the black community. The focus is on individual conversion experiences within the context of social movements. The transformations of political groups (for example, Black Panther party) and outstanding activists and intellectuals (such as Malcolm X) are used as reference points for analytical discussion of theory.

**[302 Social and Psychological Effects of Colonialization and Racism]** Spring. 4 credits.

Offered in alternate years; not offered 1983-84.  
Staff.]

**[303 Blacks in Communication Media and Film Workshop]** Spring. 3 credits. Not offered 1983-84.

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 are group writing projects, a term paper, and the screening of significant American and Third World films.]

**[344 Neocolonialism and Government in Africa (The Politics of Public Administration)]** Fall. 4 credits.

T R 1:25-2:15. Not offered 1983-84.  
The course is designed to explain why Africa's public administrations in the postcolonial era have generally failed to move from the colonialist ethos to becoming primary instruments for initiating and guiding the processes of development. The reality of colonialism,

was bureaucratic centralism—the closest approximation to the ideal type of a pure administrative state specializing in law and order. Colonial administrations resembled armies in their paramilitary formation and ethos and were, indeed in a number of cases, the instruments of military men. Much attention focuses on the internal characteristics of bureaucratic organizations in Africa and of their relationship to their social and political environments.]

**345 Afro-American Perspectives in Experimental Psychology (also Psychology 345)** Spring. 3 or 4 credits. Prerequisite: an introductory course in psychology or AS&RC 171. Offered alternate years.

L. Fitzgerald.

**346 African Socialism and Nation Building** Spring. 4 credits.

An exploration and critical analysis of the various theories of African socialism as propounded by theorists and practitioners. Those ideas, extending from Nyerere's Ujamaa (for example, traditional social and economic patterns of African society) to Nkrumah's scientific socialism (such as the desirability and practicality of the Marxian type of socialism in Africa) are compared.

**[350 The Black Woman: Social and Political History]** Spring. 3 credits. Not offered 1983-84.

T R 1:20-2:30.  
This course will address the social organizations, political protests, and political ideologies written by or about black women in the United States, from slavery to the 1980s. Topics will include the special role of black women in slavery, the political-protest thought of black women writers in the nineteenth and twentieth centuries (e.g., Ida B. Wells, Mary Church Terrell, Ella Baker, Mary McLeod Bethune, Eleanor Holmes Norton, Angela Davis), the emergence of black feminism, and the various social-political controversies surrounding the relationship between black women to both the civil rights and black power movements.]

**351 Politics in the Afro-Caribbean World: An Introduction** Fall or spring, according to demand. 4 credits.

L. Edmonson.  
A study of the social, political, economic, and psychological forces that have shaped Caribbean societies.

**[352 Pan-Africanism and Contemporary Black Ideologies]** Spring. 4 credits. Not offered 1983-84  
A historical study of Pan-Africanism that reviews and analyzes the literature and activities of early black Pan-African theorists and movements.]

**360 Ancient African Nations and Civilizations** Fall. 3 credits.

M W F 1:25-3:20. C. Mbata  
An introduction to African history beginning with early civilizations in pre-European Africa.

**361 Afro-American History (from African Background to the Twentieth Century)** Fall. 3 credits.

M W F 10:10.  
Designed to explore major themes of the black historical experience in America from African origin to the twentieth century. A major concern is the changing status of black people over time and their attempts to cope with bondage, racism, circumscription, and oppression.

**370 Afro-American History: The Twentieth Century** Spring. 3 credits.

M W F 12:20-1:10.  
An exploration of major themes of the black historical experience in America during the twentieth century. The socioeconomic, political, and cultural condition of Afro-Americans is assessed after their presence in this country for more than three hundred fifty years.

**381 Contemporary African History** Spring. 3 credits.

M W 12:20-1:25. C. Mbata.

A survey of the present problems on the African continent as they appear from 1500 to the present time. Important topics include the impact of the Atlantic slave trade, the European scramble of 1884, various forms of African resistance to colonial occupation in 1914, and the prospects of protracted social unrest in Africa south of the Zambezi River.

**382 Comparative Slave Trade of Africans in the Americas** Fall. 3 credits.

T R 1:25-2:30.

The focus is on eighteenth- and nineteenth-century slave societies in Virginia and South Carolina in North America and the eighteenth-century slave societies in San Domingue or Haiti and to some extent in Jamaica. The slave society in Cuba during the latter part of the nineteenth century is studied.

**400 Political Economy of Ideology and Development in Africa** Spring. 4 credits.

T R 11:15.

This course explores the processes of the historical underdevelopment of Africa, drawing upon the assumptions of the underdevelopment theory. It then takes up the problems of development by examining the different ideologies and strategies extant and by highlighting the interaction of political and economic forces. Case studies are drawn from Ghana, Kenya, and Tanzania.

**[405 Political History of the Age of Booker T. Washington and W. E. B. DuBois]** Spring. 4 credits. Not offered 1983-84.

A review of the intellectual and political history of the black United States experience from 1890 to the eve of World War II. Although the course concentrates on two of the outstanding black historical figures of the period, Booker T. Washington and W. E. B. DuBois, other personalities and leaders within black social and political history will be examined—including Marcus Garvey, T. Thomas Fortune, A. Philip Randolph, Charles S. Johnson, William Monroe Trotter, and James Weldon Johnson. Major black issues, such as the intellectual debates between DuBois and Washington, and DuBois versus Garvey, will constitute a critical part of the discussion.]

**410 Black Politics and the American Political System** Fall. 4 credits.

T 2:30. J. Turner.

The course is designed to engage students in a survey and analysis of the theoretical and empirical basis of black politics in America. It is a sociohistorical investigation and evaluation of the variety of practical political activities among black people in the United States.

**420 Social Policy and the Black Community in the Urban Economy** Spring. 4 credits. Offered alternate years.

J. Turner.

Examination of the social, political, and economic factors contributing to the development and perpetuation of the so-called ghetto, principally in urban areas. Particular emphasis will be placed on the current conditions in black communities.

**422 African Literature.** Fall. 4 credits.

T R 2:30-4:25. A. Graves.

A detailed study of twentieth-century fiction works from English-speaking and French-speaking sub-Saharan Africa. (All works will be read in English.) Discussion will center around the function of literature and of the writer in African society, as reflected in the writings at hand. Representative authors to be studied will include Laye, Oyono, Achebe, Soyinka, Armah, Abrahams, and Ngugi.

**425 Advanced Seminar in Black Theatre** Fall. 4 credits.

The course involves the study and production of the total black theatre.

**431 History of Afro-American Literature** Fall. 4 credits.

M. Evans.

An extensive examination of the impact that Afro-American literature has had on describing, explaining, and projecting the Afro-American experience from 1619 to the present.

**432 Modern Afro-American Literature** Spring. 4 credits.

M. Evans.

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.

**460 History of African Origins of Major Western Religions** Fall or spring. Not offered fall 1983. 4 credits. Prerequisite: sophomore status or permission of instructor.

Y. ben-Jochannan.

The course is designed to develop an understanding of the basic origins of the philosophical, theosophical, and magical-religious teachings responsible for Judaism, Christianity, and Islam.

**475 Black Leaders and Movements in Afro-American History** Spring. 4 credits.

T R 3:35-4:25.

A comprehensive analysis of the personalities, ideas, and activities central to the struggle for Afro-American liberation, ranging from eighteenth-century figures to the present time. Rebellion, emigration, assimilation, nationalism, accommodation, protest, cultural pluralism, separation, integration, and revolution are some of the central issues.

**[483 Themes in African History]** Fall. 4 credits. Not offered 1983-84.

A study of selected themes in African history, making use of work done in related disciplines. Until further notice the selected topics will be women in African history.]

**484 Politics, Conflict, and Social Change in South Africa** Spring. 4 credits.

M W 1:24-4:25.

The course examines the history of the African liberation movement from the post-World War II era to the present, focusing as much on the areas already liberated through "revolutionary violence" (Guinea, Mozambique, Angola, Zimbabwe) as on the remaining "stronghold" of domination (South Africa and Namibia.)

**485 Racism, Social Structure, and Social Analysis Seminar** Spring. 4 credits.

W 2-4:25. J. Turner.

An examination of the social structure of American society and the relationship of racial and class categories to social stratification. An analysis of power structures and the social salience of socioeconomic connections of government decision makers and the corporate structure is developed.

**490 Advanced Reading and Research Seminar in Black History** Spring. 4 credits. May be taken to fulfill requirements for a major in African or Afro-American studies.

M W 1:25. C. Mbata.

Designed to help students acquaint themselves with the available sources of information and materials in black history, as well as make the maximum use of their own inclinations and interests in unearthing the material and creating a body of comprehensible conclusions and generalizations out of it.

**495 Political Economy of Black America** Spring. 4 credits.

M W 10:30-12:05.

An examination of the role that black labor has played in the historical development of United States monopoly, capitalism, and imperialism. Emphasis is

on the theory and method of political economy and a concrete analysis of the exploitation of black people as slave labor, agricultural labor, and proletarian labor.

**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.

**500 Political Theory, Planning, and Development in Africa** Spring. 4 credits.

T R 11:15-12:45.

The course explores the processes of underdevelopment of Africa from the epoch of slavery through colonial and neocolonial phases of domination, drawing on the assumptions of "underdevelopment" theory à la G. Frank, Walter Rodney, and others. It then takes up the differential content and emphasis on socialistic and capitalistic strategies by highlighting the interaction of political and economic forces. Case studies are drawn from Ghana, Kenya, and Tanzania.

**505 Workshop in Teaching about Africa**

4 credits. Prerequisites: AC&RC 203 and 204 or AS&RC 360 and 361 or permission of instructor. Offered alternate years.

C. Mbata.

**510 Historiography and Sources: The Development of Afro-American History** Fall. 4 credits. Prerequisite: upperclass or graduate standing or permission of instructor.

T 9:30-12:05.

Through a critical examination of the approach, methodology, and philosophy of major writers in this field, such as James W.C. Pennington, George Washington Williams, W. E. B. DuBois, Carter G. Woodson, John Hope Franklin, Benjamin Quarles, Lerone Bennett, Jr., and Vincent Harding, the evolution of Afro-American history is traced from its origin to the present. The nature and purpose of Afro-American history, especially the role of the black historian in the context of a racist and oppressive society, is analyzed. Attention is given to sources for studying black history, and each participant fashions a conceptual framework for application to the materials and evidence of the black experience in America.

**515 Comparative Political History of the African Diaspora** 4 credits. Prerequisites: upperclass or graduate standing or two of the following courses:

AS&RC 203, 204, 283, 360, 361, 475, 484, 490. Offered alternate years.

**[520 Historical Method, Sources, and Interpretation]** Fall. 4 credits. Prerequisite:

upperclass or graduate standing or two of the following courses: AS&RC 203, 204, 361, 475, 484, 490. Offered alternate years. Not offered 1983-84.

C. Mbata.]

**[550 Transnational Corporations in Africa and Other Developing Countries]** Spring. 4 credits.

Prerequisites: upperclass or graduate standing or permission of instructor. Not offered 1983-84. Examines the role of transnational enterprises as an economic and political factor in the Third World, their relations with the host government, and their interaction with both the private and public sectors of the economy of the host country. Special emphasis on Africa and Latin America.]

**551 Political History of Social Development in the Caribbean** Offered according to demand. 4 credits.

Prerequisite: upperclass or graduate standing or permission of instructor.

L. Edmonson.

For description see AS&RC 351.

**571 Seminar: Psychological Issues in the Black Community** Fall. 4 credits. Prerequisite: permission of instructor.

R 9:05-12:05. W. Cross.

A critical examination of existing theory and research on identity development and identity transformation in Afro-American life, including black identity metamorphosis that occurs within the context of social movements. Particular attention is given to (1) the interface between social systems and identity development and maintenance; (2) dual consciousness; (3) functions of identity in daily life; (4) conversion and deconversion within the contexts of the contemporary black movement; (5) the psychohistorical implications of unidimensional theories of black self-concept; (6) the relationships among identity, behavior, and ideology.

**698-699 Thesis** 698, fall; 699, spring. Limited to Africana Studies and Research Center graduate students.

Africana Center faculty.

## American Indian Studies Program

Raymond Fougner, director, 215 Stone Hall, 256-6587

The American Indian Studies Program (AISP) is a multidisciplinary, intercollege program consisting of instructional, research, and extension components. 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.

The University has a commitment to broadening the educational opportunities and experiences of students from all backgrounds. The AISP offers courses that enhance the awareness of all students 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.

During the summer Cornell sponsors a Native American Studies Institute and an Indian Teacher Training Program. The institute's program of instruction covers a broad range of topics relevant to American Indian studies. The teacher training program provides participants with the skills needed in a bilingual-bicultural learning environment.

A specific objective of the AISP is to assist Indian groups and organizations in their efforts to address the issues they face. The thrust of the AISP's research and extension efforts is directed at developing solutions to problems identified by Indian people. In this way the AISP can serve as a catalyst to stimulate the application of institutional expertise and resources to community needs.

Cornell is also embarking on the replication of an authentic protohistoric Iroquois dwelling. This project is intended to facilitate the understanding of Iroquois culture by providing a study center that will serve the residents of central New York State. Advisers from the Indian community are assisting the AISP in meeting the objectives of this effort.

The instructional, research, and extension components are expected to expand and develop during the initial three years of the program. Further development of courses is expected in a number of departments. Cooperative extension is assisting in efforts to provide services to Indian communities in New York State. Research initiatives will be directed toward assisting Indian groups in areas such as wildlife management, agriculture, industrial and labor relations, and social and economic development.

## American Indian Studies Concentration

American Indian studies offers an interdisciplinary approach to the study of American Indian life. Course work in various colleges and departments of the University will provide a broad base for

understanding the past, present, and future of Indian people. Students selecting a concentration in American Indian Studies must take ALS 100 and four additional courses from those listed below. At least one course must be selected from each group. All course work must be approved by an adviser from the program.

### Introduction

**ALS 100 Introduction to American Indian Studies** Fall. 3 credits.

T R 10:10. R. Fougner.

This course provides a foundation for the study of the American Indian. Emphasis will be placed on the social, cultural, historical, educational, and human development of the American Indian. Guest lecturers from the Cornell staff and the Indian community will serve to broaden the scope of the course.

### The Indian Traditions

**Anthropology 230 Ethnology of Native North America** Fall. 4 credits.

M W F 1:25. B. Lambert.

A general survey of the ethnography of North America, with emphasis on problems and topics to which the North American materials are most relevant. Selected cultures will be considered in some detail.

**Anthropology 354 The Peopling of America** Fall. 4 credits.

M W F 9:05. T. Lynch.

A study of the prehistoric cultures of the New World. Major topics include the entry of man, early adaptations to diverse environments, hunting and gathering people to the ethnographic present, and the beginnings of agriculture.

### Indians in Transition

**History 119 History of North American Indians** Spring. 3 credits. Prerequisite: permission of instructor.

R 2:30-4:25. D. Usner.

This seminar examines major themes in Native American history from colonial times to the present. Discussions will consider the cultural histories of particular tribes as well as the comparative elements of Indian relations with non-Indians.

**[History 209 Political History of American Indians** Not offered 1983-84.

An investigation of political organizations and evolution among Indian 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, colonial policies and treaties, federal-state-tribal sovereignties, and Indian strategies of autonomy and resistance through the plains wars.]

**History [323]-324 Native American History** [323 not offered 1983-84]; 324, spring. 4 credits.

M W F 12:20. D. Usner.

A survey of North American Indians from the beginnings of European contact to the present. Cultural, political, and economic changes experienced by particular societies will be covered. Emphasis given to general themes of Indian-white relations, comparative tribal histories, and the role of Native Americans in the overall history of the United States.

**History 429 American Indians in the Eastern United States** Spring. 4 credits.

R 10:10-12:05. D. Usner.

A seminar examining the history of Native Americans east of the Mississippi River from the colonial era to the present. The cultural and economic participation of American Indians in the evolution of frontier societies as well as the impact of Indian/non-Indian relations on tribal societies will be studied. Major topics include fur-trade networks, political alliances,

warfare, resistance against removal, and the persistence of Indian communities within eastern states.

**Anthropology 318 Ethnohistory of the Northern Iroquois (also ALS 318)** Spring. 3 or 4 credits.

T R 2:30-3:45. S. Saraydar.

The development of Northern Iroquoian cultural patterns is examined in depth from the prehistoric Woodland period to the present day. Archaeological and ethnographic data are critically evaluated and combined both to trace the history of the Iroquois people and to enable their cultural ecology to be reconstructed. Supplemental information is drawn from accounts of neighboring groups in southern Ontario and western New England to provide a regional perspective and to fill gaps in the chronicles of the early-contact period.

### Contemporary Issues

**Rural Sociology 175 Issues in Contemporary Native American Societies** Spring. 3 credits.

T R 10:10. R. Fougner.

Native American 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 a Native American point of view. Early history and the postcontact period will be reviewed with an emphasis given to recent developments. 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.

**Anthropology 242 American Indian Philosophies I (also Rural Sociology 242)** Fall. 3 credits.

T R 2:30-3:45. S. Saraydar.

This course is designed to facilitate an understanding of the world views of American Indians of the past and present. The philosophies of contemporary figures such as Lame Deer, Deloria, Momaday, and the enigmatic don Juan are evaluated along with those of Black Elk, Handsome Lake, and other Indians of earlier times. 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.

**Anthropology 367 American Indian Tribal Governments (also Rural Sociology 367)** Fall. 3-4 credits. Prerequisites: ALS 100 or Anthropology 230 or consent of instructor.

W 7:30-9:55 p.m. S. Saraydar.

This course focuses on the structure of contemporary tribal governments and the ways in which these governments approach the issues confronting their constituents. The effects of European contact on traditional political organizations are detailed as are the present day relations of tribal governments to federal and state governments.

**Anthropology 442 American Indian Philosophies II (also Rural Sociology 442)** Spring. 4 credits.

W 7:30-9:25 p.m. plus additional sessions to be arranged. S. Saraydar.

This course provides an opportunity for students to pursue topics of interest from American Indian Philosophies I in greater depth. The specific topics to be investigated will be selected by the students in consultation with the instructor before the beginning of the semester.

**[Rural Sociology 440 The Social Impact of Rapid Resource Development** Not offered 1983-84.

The seminar defines social-impact assessment (SIA) and identifies alternative models of doing social-impact assessment and the experience various rural minorities have had with SIA, especially American Indians. Students will learn certain practical research skills needed in doing SIA and will participate in an SIA simulation in rural New York.]

### Independent Study

Students who want to sign up for independent study as part of the concentration must have the approval of an American Indian studies faculty member. Independent study courses within departments will be used for this purpose.

### Biology and Society

Prof. John L. Ford, chairperson; Frederick H. Buttal, vice chairperson, 632 Clark Hall, 256-3810

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, ethics, and public policy, as well as for students who plan postgraduate study in management, health, medicine, law, or other related fields.

### The Major

Because the biology and society major is multidisciplinary, students must attain a basic understanding of each of the several disciplines it comprises, including introductory courses in the fields of biochemistry, chemistry, mathematics, genetics, ecology, ethics, and history. In addition, majors are required to take a two-semester core sequence in biology and society, a set of electives, and a special senior seminar. Programs incorporating these required courses are designed in consultation with faculty advisers 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, contact Professor John L. Ford, Program on Science, Technology, and Society, 632 Clark Hall.

**Honors** (for students in the College of Arts and Sciences only)

**Basic requirements.** The basic requirements for a Bachelor of Arts with honors for students majoring in biology and society shall be: (1) a seminar (4 credits) taken during the first semester of the senior year; (2) a tutorial (4 credits) taken during the second semester of the senior year; and (3) a satisfactory honors thesis written in conjunction with the seminar and the tutorial and satisfactorily defended. Students wishing to do honors work must make formal application at the time of registering for their first-semester honors seminar. The honors seminar may be one of the regular biology and society senior seminars specially adapted for the development of an honors thesis.

Candidates for the degree of Bachelor of Arts with honors in biology and society must (1) submit an application to the chairperson of the major, explaining how the honors thesis is expected to fit into the candidate's undergraduate program, and (2) have an average of B in all subjects and B+ in biology and society courses.

**The honors thesis.** Work on the honors thesis shall begin in the honors seminar with the preparation of an outline and bibliography and shall be completed in the honors tutorial. An honors thesis outline and bibliography shall be submitted prior to the beginning of the final examination period of the first semester; a polished first draft at least five weeks prior to the final examination period of the second semester.

The honors thesis shall be written under the direction of two honors thesis faculty advisers. Candidates for honors shall first find a member of the Biology and Society Major Committee willing to serve as an adviser, and the student and this adviser shall then find a second adviser from among the faculty at large. The purpose of the second adviser is to guarantee expertise in the subject matter covered by the thesis.

When a thesis has been completed in a form generally satisfactory for purposes of evaluation, the candidate shall meet with the thesis advisers and formally defend it.

**Evaluation and recommendation.** Following the formal defense of the thesis, the thesis advisers shall submit to the chairman of the Major Committee a recommendation regarding the level of honors to be awarded. This recommendation shall include: (1) an evaluation of the thesis; (2) an evaluation of the student's academic record in the biology and society major; and (3) a justification for the level of honors proposed.

This recommendation shall be circulated to the members of the Biology and Society Major Committee for information and ratification. Unless there is serious disagreement, the recommendation of the advisers shall stand. If there is serious disagreement, the chairperson of the committee shall make the decision after consultation with the interested parties.

### Freshman Seminars

**100 Ways of Seeing** Fall or spring. 3 credits.

M W F 10:10. S. Siskin.

What we can and do see in the physical world—and how we communicate it to others—is influenced by our visual system, culture, experience, interests, and values. In this course we will survey these influences as they bear on vision in everyday life, visual art, and imaginative literature. Our survey will be based on readings in science, art history and criticism, and literature and on slides of works of art. *Note:* although we will study the visual system in some detail, no special scientific background is necessary for the course.

**102 Hard Choices (also Sociology 100.5)** Fall. 3 credits.

M W F 11:15. S. Siskin.

Many people believe that no restrictions should be placed on the pursuit and dissemination of scientific, medical, and technical knowledge. But what if a research technique may endanger public health and safety, or published research findings can be exploited for bad ends? Are restrictions then appropriate? What form should they take? Who should decide? We will examine how such questions challenge many traditional attitudes toward knowledge and pose the dilemmas for science, medicine, engineering, universities, and society. Discussion will be based on readings in drama, fiction, and philosophy and on debate over such issues as genetic engineering.

**103 Writing as a Naturalist** Fall. 3 credits.

M W F 12:20–1:35. A. Boehm.

This course is about the complex relation between human consciousness and culture, and theologians and environmentalists, as well as authors of natural history. Students in the course will be encouraged to consider their own experience in the natural world from similarly various perspectives. Writing assignments will be based upon the reading and students' own ideas and observations. The texts will include works by Annie Dillard, Wendell Berry, John Passmore, Robert Bly, Farley Mowat, and Christopher Stone.

### General Undergraduate Courses

**214 The Biological Basis of Sex Differences (also Women's Studies 214 and Biological Sciences 214)** Spring. Prerequisite: one year of introductory biology.

Lecs, T R 8:35-9:55, and occasional 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, and, 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.

**287 History of Biology (also History 287 and Biological Sciences 201)** Fall. 3 credits.

Prerequisite: one year of introductory biology. S-U grades optional.

Lecs, T R 10:10-11:30. 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 semester covers the period from classical antiquity to 1900.

**288 History of Biology (also History 288 and Biological Sciences 202)** Spring. 3 credits.

Prerequisite: one year of introductory biology. S-U grades optional.

Lecs, T R 10:10-11:30. 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 semester is devoted entirely to twentieth-century biology.

**301 Biology and Society I: The Biocultural Perspective (also Anthropology 301 and Biology and Society 301)** Fall. 3 or 4 credits (4 credits with discussion section). Prerequisite: one year of introductory biology. S-U grades optional. This is part of the two-semester core sequence for the biology and society major and is also available to other students who have fulfilled the necessary prerequisite.

Lecs, T R 8:40-9:55. D. Greenwood.

Human biology, behavior, and institutions are viewed as the ongoing products of the interactions between human biological evolution and cultural change. These interactions are documented with reference to the evolution of the capacity for culture; human groups and institutions; language, meaning, and cultural realities; and major models of human nature and human institutions.

**302 Alternative Food Production Systems (also Biological Sciences 302)** Spring. 3 or 4 credits (4 credits by arrangement with instructor). Prerequisite: Anthropology/Biology and Society/Biological Sciences 301 or permission of instructor. S-U grades optional. This is one of two courses fulfilling the second-semester core sequence requirement for the biology and society major and is also available to other students who have taken 301.

Lecs and discs, T R 10:10-11:30. S. Swzey.

Substantiation is presented for the claim that significant changes in our food production system are needed. The inadequacies in our current system are examined from a multidisciplinary perspective, with consideration of the relevant scientific, social, public policy, and ethical issues. Current controversies on such issues as energy use in agriculture, crop breeding programs, soil conservation, chemicals in agriculture, and international food policy are considered. Emphasis is placed on developing alternatives to current practices. Lectures covering assigned readings are followed by discussion sessions.

**310 Issues in Biology and Society: Chemicals, Enzymes, and Maladies** Fall. 4 credits (3 credits by arrangement with instructor). Prerequisite: Anthropology/Biology and Society/Biological Sciences 301 and a biochemistry course or permission of instructor. This or Biology and Society 302 fulfills the second-semester core course requirement for the biology and society major and is also available to other students who have taken 301.

Lecs and discs, T R 10:10-11:30. J. Fessenden-Raden.

The biochemical effects of toxic chemicals as potential health hazards will be examined from a multidisciplinary perspective. Scientific, social, public policy, and ethical issues will be critically analyzed. Topics include occupational and environmental chemical hazards within a biochemical examination of the role of specific chemicals such as carcinogens, allergens, mutagens or teratogens. Chemical diseases will also be discussed. Lectures with assigned readings will be followed by a discussion period.

**311 Issues in Biology and Society: Professional Ethics** Spring. 4 credits. Limited to 20 students.

R 2:30-4:30. S. Brown, Jr.  
An examination of the role of professions in our society and a comparison of the setting of professional standards and problems of professional ethics in medicine, engineering, law and other professions.

**312 Issues in Biology and Society: The Anthropology of Medicine (also Anthropology 312)** Spring. 4 credits. Limited to 15 students. Prerequisites: Anthropology/Biological Sciences/Biology and Society 301 or permission of instructor.

R 2:30-4:30. D. Greenwood, D. Holmberg.  
An examination of contemporary medical systems from an anthropological perspective and an evaluation of current approaches to the anthropology of medicine.

**347 Human Growth and Development: Biological and Social Psychological Considerations (also Human Development and Family Studies 347)** Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent, Human Development and Family Studies 115 or Psychology 101 and Nutritional Sciences 115 or equivalent.

M W F 1:25-2:15. J. Haas, H. Ricciuti.  
A review of major patterns of physical growth from the fetal period through adolescence, with consideration of biological and socioenvironmental 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).

**375 Independent Study** Fall or spring. Credit to be arranged.

Hours to be arranged. Staff.

**Senior Seminars**  
(Biology and Society 400-408)

**400 Seminar in the History of Biology (also History 447)** Fall. 4 credits. No prerequisites.

T 2:30-4:25. W. Provine.  
Scientific method, creativity, and discovery, viewed from the perspective of the history of biology. Special emphasis will be placed upon the role of aesthetics in biological research.

**401 Population Policies (also Sociology 531)** Fall. 4 credits. Prerequisite: graduate standing or permission of instructor.

W 3:35-5:30. J. M. Styos.  
The ways in which societies try to affect demographic trends. Special focus is on government policies and programs to influence fertility.

**[402 The Ecological Consequences of Nuclear War (also Peace Studies 402)]** Fall. 4 credits. Prerequisite: Biological Sciences 260 or 360, or Government 312 or 384 or permission of instructor. Not offered 1983-84.

M. Harwell.]

**403 Seminar in the History of Biology (also History 448)** Spring. 4 credits. No prerequisites.

T 2:30-4:30. W. Provine.

The warfare between science and religion from Galileo to the present. Eminent Cornellians from Andrew Dickson White to Frank H. T. Rhodes will be represented in the readings.

**405 The Social Functions of Law and Medicine** Spring. 4 credits. Limited to 15 students. Prerequisite: Biology and Society 311 or 301 or permission of instructor.

T 2:30-4:25. L. I. Palmer.  
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, 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.

**406 Special Problems in the Anthropology of Sex and Gender (also Anthropology 422 and Women's Studies 422)** Fall. 4 credits.

R 2:30-4:25. K.S. March.  
Each year this seminar focuses on a particular area in the anthropology of sex and gender, building on work done in Anthropology/Women's Studies 321. The topic for fall 1983 will be women in international development. The seminar will look at the integration of women into development planning and projects: the confrontation between the feminisms of developing and developed countries, political rights and participation, land reform, credit, agricultural extension services, technological change, small and landless farmers, migration, informal marketing, domestic service, cottage industry, multinational industry, legal reform, education, family planning, fertility, and infant formulas. Overall, the seminar pivots around the question of how much Western sexual and family norms, as well as preconceptions about the place of men and women in the public sector, lie at the heart of Western models for development intervention.

**408 Genetic Engineering, Technological Change, and Agriculture (also Rural Sociology 405)** Fall. 3 credits. Prerequisites: two courses each in the agricultural or biological sciences and social sciences. S-U grades optional.

Lecs. W 1:25-4:25. F. Buttel.  
An examination of socioeconomic aspects of biotechnology in the context of historical patterns of technological change in agriculture in developed and developing countries. Background is provided on scientific aspects of biotechnology, and the major topics covered include the social organization of genetic engineering research, industry-university relationships, and the impacts of genetic engineering on agriculture.

**China-Japan Program (140 Uris Hall)**

T. J. Pempel, director; S. Cochran, associate director; R. Barker, M. Barnett, M. G. Bernal, K. Biggerstaff, N. C. Bodman, K. Brazell, A. Cook, L. Cornell, B. deBary, B. Faure, E. M. Gunn, E. H. Jorden, V. Koschmann, L. C. Lee, D. McCann, J. McCoy, T. L. Mei, V. Nee, J. Nickum, C. A. Peterson, C. Ross, P. S. Sangren, H. Shadick, V. Shue, R. J. Smith, M. W. Young

The China-Japan program includes faculty members who have a commitment to teaching and research on China and Japan. The program is interdisciplinary and is organized to encourage and assist students in the study of the two great civilizations of East Asia. In addition to offering a substantial number of courses in the languages of China and Japan, program faculty members cover most of the major disciplines by means of courses given in several departments. The program is especially rich in courses that deal with the history, literature, society, culture, and art of East Asia. Undergraduates who wish to concentrate their studies on China or Japan may do so by declaring a major in the Department of Asian Studies

and selecting an adviser from the faculty members listed above. Students interested in Chinese and Japanese studies should consult the *Announcement of the Graduate School*. For further information, students should contact the director or any staff member in the China-Japan Program Office, 140 Uris Hall.

**College Scholar Program**

Dean Lynne Abel, director, 134 Goldwin Smith Hall, 256-3386

The College Scholar program is described in the introductory section, p. 97.

**397 Independent Study** Fall or spring. 1-4 credits. Prerequisite: permission of program office.

**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.

**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 in order to pursue university-level studies in the United States, as well as for visitors, businessmen, 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, Literatures, 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, U.S.A. Application materials and information are available directly from the program or by calling 607/256-4863.

**Freshman Seminar Program**

F. V. Bogel, director, 159 Goldwin Smith Hall, 256-4061; K. K. Gottschalk, assistant director

Each semester of their freshman year at Cornell, most students choose a Freshman Seminar from among more than seventy-five courses offered by over twenty different departments in the humanities, social sciences, expressive arts, and, occasionally, the sciences. These courses share one major purpose: to offer the student practice in writing English prose. They also ensure that beginning students may enjoy the benefits of a class no larger than eighteen students. The following courses are Freshman Seminars. Since, however, Freshman Seminar offerings sometimes vary from semester to semester, the following should be considered only as representative of the kinds of courses usually offered in a term; for up-to-date information, students should consult the Freshman Seminar brochure available from college registrars before fall and spring registration. For more information about the Freshman Seminar Program and its requirement, see p. 15.

**Africana Studies**

For full descriptions of the following courses see Africana Studies and Research Center, page 200



**137 Afro-American Writing and Expression**

Fall. 4 credits.  
T R 10:10-12:05. A. Graves.

**138 Applied Writing Methods on Afro-American Topics**

Spring. 3 credits.  
T R 10:10-11:25. A. Graves.

**171 Infancy, Family, and the Community**

Fall. 4 credits.  
T R 3:10-4:25. W. Cross.

**172 Teaching and Learning in Black Schools**

Spring. 4 credits.  
T R 3:10-4:25. W. Cross.

**203 History and Politics of Racism and Segregation**

Fall. 4 credits.  
T R 12:20-2:15. C. Mbata.

**204 History and Politics of Racism and Segregation**

Spring. 4 credits.  
T R 12:20-2:15. C. Mbata.

**231 Black Political Thought**

Fall. 3 credits.  
M W 11:30-1. J. Turner.

**290 The Sociology of the Black Experience**

Fall. 3 credits.  
M W 3:10-4:25. J. Turner.

## Anthropology

For a full description of the following course see Anthropology, p. 102.

**130 Apes and Languages**

Fall and spring. 3 credits.  
B. Lantz and staff.

## Archaeology

For a full description of the following course see Archaeology, p. 105.

**107 Popular Archaeology**

Fall and spring. 3 credits.  
M W F 1:25, A. Wonderley; T R 1-2:15, M. Anders.

## Asian Studies

**104 Three Ways of Thought**

Fall. 3 credits.  
M W 2:30-3:45. T. Mei, S. Hoare.

**105 Feminine and Masculine Ideals in Japanese Culture**

Spring. 3 credits.  
M W F 12:20. V. Helm.

## Biology and Society

**100 Ways of Seeing**

Fall and spring. 3 credits.  
M W F 10:10. S. Siskin.  
What we can and do see in the physical world—and how we communicate it to others—is influenced by our visual system, culture, experience, interests, and values. In this course we will survey these influences as they bear on vision in everyday life, visual art, and imaginative literature. Our survey will be based on readings in science, art history and criticism, and literature and on slides of works of art. (Note: Although we will study the visual system in some detail, no special scientific background is necessary for the course.)

**102 Hard Choices (also Sociology 100.5)**

Fall. 3 credits.  
M W F 11:15. S. Siskin.  
Many people believe that no restrictions should be placed on the pursuit and dissemination of scientific, medical, and technical knowledge. But what if a research technique may endanger public health and safety or published research findings can be exploited for bad ends? Are restrictions then appropriate? What form should they take? Who should decide? We will examine how such questions

challenge many traditional attitudes toward knowledge and pose dilemmas for science, medicine, engineering, universities, and society. Discussion will be based on readings in drama, fiction, and philosophy and on debate over such issues as genetic engineering.

**103 Writing as a Naturalist**

Fall. 3 credits.  
T R 12:20-1:35. A. Boehm.  
This course is about the complex relation between human consciousness and culture and the natural world. We will read essays by sociologists, poets, economists, theologians, and environmentalists, as well as by authors of natural history. Students in the course will be encouraged to consider their own experience in the natural world from similarly various perspectives. Writing assignments will be based upon the reading and students' own ideas and observations. The texts will include works by Annie Dillard, Wendell Berry, John Passmore, Robert Bly, Farley Mowat, and Christopher Stone.

## Classics

For full descriptions of the following courses see Classics, p. 117.

**120 Slave and Free in Ancient Rome**

Fall. 3 credits.  
M W F 11:15. J. Ginsburg.

**121 Freshman Seminar in Classical Archaeology**

Fall and spring. 3 credits.  
Fall: M W F 10:10; spring: M W F 12:20.  
D. McGuire.

**150 Freshman Seminar in Greek and Roman Myths**

Fall and spring. 3 credits.  
M W F 9:05, 1:25, or 2:30. Staff.

## Comparative Literature

Individual sections of each course may vary. For information about courses and class meeting times in the spring term consult the Freshman Seminar brochure.

**102 Tales of Mystery, Quest, and Self-Discovery**

Fall and spring. 3 credits.  
Fall: M W F 11:15, S. Riemer; T R 8:40-9:55,  
D. Martyn.

On the premise that storytelling always begins with an appeal to the reader's curiosity, this course deals with three kinds of mystery and discovery: psychological fiction (how does a writer involve the reader in a character's discovery of his or her own nature?); detective stories (how does the writer tease or satisfy our curiosity about hidden events?); and allegorical narrative (how can a writer's creation of fantastic or terrifying worlds lead the reader to new perceptions about his or her own world?). Student essays critically analyze the reading, which often includes science fiction, Poe, and Dostoevsky but which may range across drama, poetry, and philosophy and incorporate popular culture as well as recognized literary classics.

**103 Inner Worlds, Outer Worlds, Other Worlds**

Fall and spring. 3 credits.  
Fall: M W F 9:05. K. Shea.  
A consideration of different literary worlds from the realistic to the romantic, grotesque, and fantastic. In examining the writer's creation of familiar reality, we will ask what our perceptions and ideas about the world have to do with the way things are. Readings drawn from authors such as Hoffmann, Ibsen, Kafka, Beckett, Yeats, and others exemplify a variety of literary forms—e.g., fiction, drama, and poetry—and provide the basis for students' critical essays.

**105 The Hero in Literature**

Fall and spring. 3 credits.  
Fall: M W F 10:10, J. Durholz; T R 10:10-11:25,  
M. Proctor.

This course will study the portrayal of heroes in literature from various periods and cultures. Readings illustrate a variety of attitudes and literary styles: realism, idealization, grotesque or fantastic exaggeration, parody, and political engagement. Students write critical essays on works by authors such as Sophocles, Shakespeare, Brecht, Beckett, and others.

**108 Language and Politics**

Fall and spring. 3 credits.  
Fall: M W F 10:10. R. Bean.  
Can language be simultaneously objective and committed? The seminar considers both the language of politics and the politics of language in the reading as well as the writing assignments. We will question the everyday distinction between the political and the apolitical, between reading and writing, and between professional writing and student writing. The focus is on the ideological significance of various forms of discourse: advertisements, newspaper articles and editorials (a basic text will be the *New York Times*), public speeches and political essays, the lyrics of popular music, and more conventional specimens of contemporary literature. Supplementary readings probe the racial, sexual, social, and political assumptions of standard English. Written work—first frequent short papers and then longer essays—includes imitations and critical analyses of the readings and self-critical accounts of earlier writing assignments.

## English

For information about class meeting times for all courses given in the spring and for some that are given in the fall, consult Freshman Seminar Program publications.

**105 Women and Writing (also Women's Studies 106)**

Fall and spring. 3 credits each term.  
Fall: M W F 9:05, or T R 8:40-9:55 or 10:10-11:25.  
M. Hite, M. Thickstan, L. Berlant. Spring:  
M. Jacobus and 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 relation 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 relations between women and writing. Which section to choose should depend on the student's 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 Women's Studies office and the English department 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.

**108 Writing about Film (also Theatre Arts 108)**

Fall and spring. 3 credits.  
Fall: T R 8:40-9:55, 10:10-11:25, or 2:30. D. Fried,  
S. Offer, B. Orr, K. Dugas.  
This course is meant to serve not as an introduction to film analysis but as a writing seminar that takes cinema as its primary object of attention. Some attempt will be made to explore the usefulness of basic aspects of film, such as framing or montage, as illustrative analogies to principles of writing and to examine cinema's rhetorical power as a way of raising questions about our own use of persuasion in writing. Students will view a wide range of popular and art films (some of them silent and/or foreign), including *Citizen Kane*, *October*, and *The Rules of the Game*. They will be required to attend a two-hour screening outside of class approximately once a week. The writing requirement comprises five papers

averaging five pages in length, and eight to ten short writing assignments. No familiarity with film history or analysis is expected.

**115 The State of the Language** Spring. 3 credits.  
M W F 12:20. B. Adams.

Readings consist of nontechnical essays about the current state of the English language, spoken as well as written, and treat such topics as dialect, slang, jargon, correctness, propriety, permissiveness, vulgarity, obscurity, vagueness, plainness, precision, and ambiguity. The course is broadly humanistic rather than specifically literary, linguistic, or philosophical in its orientation. The required papers are frequent (about one a week), comparatively short (two to five pages each), and for the most part analytical and argumentative.

**127 Shakespeare and Politics** Fall and spring. 3 credits.

Fall: M W F 8, 9:05, or 10:10, or T R 12:20. E. Fogel, R. Sanchez, K. Humphreys, S. Pye.

Seven plays, chosen from among such texts as *Richard II*, *Henry IV*, *Henry V*, *As You Like It*, *Measure for Measure*, *Troilus and Cressida*, *Julius Caesar*, *Antony and Cleopatra*, *Coriolanus*, and *The Tempest*. While considering these works for their literary and dramatic qualities, we will study certain recurring topics: sources of political power or human rights, concepts of civility, conflicts of loyalty (love vs. honor, individuals vs. institutions, stability vs. change), and various ideas of order and rebellion. Students will write eight expository essays on questions raised by our study of the plays. Emphasis falls equally on reading and writing.

**133 Forms of the Essay** Fall and spring. 3 credits.  
Fall: M W F 9:05, 10:10, 11:15, or 12:20, or T R 8:40 or 12:20. P. Sawyer and staff. Spring: N. Kaplan and staff.

A basic introduction to the writing of essays. How does a writer turn a topic into the kind of finished essay normally required for college courses? How do his aims affect his tone, structure, evidence, and methods of persuading? We will answer these questions chiefly by discussing the students' own work as well as materials from outside—essays, advertisements, articles. Weekly assignments will be three to four pages long with two short research papers.

**135 Writing from Experience** Fall and spring. 3 credits.

Fall: M W F 8, 9:05, 10:10, 11:15, 12:20, or 1:25, or T R 8:40, 10:10, or 12:20. J. Bishop and staff.  
Spring: staff.

Designed to give each student an opportunity to write about his or her own experience in an interesting way. Most of the class time and conferences are devoted to reading, discussion, and evaluation of the students' own work.

**136 Practical Prose** Fall and spring. 3 credits.

Fall: M W F 8, 9:05, 10:10, 11:15, 12:20, or 1:25, or T R 8:40 or 10:10. H. Shaw, G. Teskey, and staff.  
Spring: S. Elledge and staff.

A course in the elements of style in expository writing, for people preparing for courses and careers where success depends on being able to answer questions and write papers with clarity and grace. Frequent short papers (about fourteen) on questions raised by careful analyses of essays by such writers as E.B. White, Lewis Thomas, Thomas S. Kuhn, George Orwell, Doris Lessing, Carl Sagan, and Henry David Thoreau. Readings for sections vary; for further information, consult the English department, 252 Goldwin Smith Hall.

**141 The Bible and Ancient Authors** Fall and spring. 3 credits.

T R 10:10-11:25. C. Kaske; T R 12:20-1:35, C. Wright.

Reading, discussing, and writing about selected books of the Bible (considered primarily as literature) and classical texts such as *The Odyssey* and Sophocles' *Oedipus Rex*.

**150 The Modern Imagination** Fall and spring. 3 credits.

M W F 9:05, 10:10, 11:15, 12:20, 1:25, or T R 12:20. F. Bogel.

A course in analytical reading and expository writing. We will read selectively from the work of such exemplary moderns as William Yeats, James Joyce, T. S. Eliot, Virginia Woolf, Dylan Thomas, Harold Pinter, William Carlos Williams, Allen Ginsberg, Tillie Olsen, Toni Morrison, and others. The readings will cover the genres of poetry, narrative, fiction, essay, and drama. Our attention will focus on the individual works as part of an experience that, in many ways, is our own. Class time will be divided between the literary works and our written responses to them.

**157 American Literature and Culture** Fall. 3 credits.

M W F 8, 9:05, 10:10, or 11:15, or T R 8:40-9:55 or 12:20-1:25. C. Strout and staff.

This course asks students to read and write about the problem of what is American about our classic literary tradition, focusing on selected classic writers and critical essays on the alleged national character of their tradition.

Consult Freshman Seminar Program publications for scheduled class times for the following courses.

**158 American Literature and Culture** Spring. 3 credits.

M. Seltzer and staff.

This course is concerned with the literary expression of American identity in the period following the Civil War. We will explore the changing confrontations between Americans and Europeans, between black and white Americans, and between men and women. Readings tentatively to include James (*Daisy Miller*), Twain (*Huckleberry Finn*), Ripoe (*The Awakening*), Hemingway (*The Sun also Rises*), Faulkner (*Light in August*), and O'Connor (*Stories*).

**165 Fantasy** Fall and spring. 3 credits.

Fall: M W F 8, 9:05, 10:10, 11:15, 12:20, 1:25, or T R 8:40 or 10:10. R. Kirschten and staff; spring: T. Murray, M. Hite, and staff.

A course in analyzing and writing about the fantastic in literature—the limits of "real experience"; the threat of nonsense, confusion, and the grotesque; and the possibility of constructing new worlds through imagination. Readings will include such authors as the Brothers Grimm, Lewis Carroll, Mary Shelley, Poe, and Vonnegut. Students will write approximately one essay on each author.

**270 The Reading of Fiction** Fall and spring. 3 credits. Register with the English department at Barton Hall, not at Freshman Seminar registration.

M W F 10:10, 11:15, 1:25, or 2:30, or T R 10:10 or 12:20. Fall: P. Marcus, J. Blackall, and staff.

Forms of modern fiction, with emphasis on the short story and novella. Critical studies of works by English, American and continental writers from 1880 to the present—Bellow, Chekhov, Conrad, Faulkner, Mann, Kafka, Joyce, and others. Students will write several short critical essays totaling approximately thirty pages. This course is open to sophomores and to freshmen who have taken a Freshman Seminar or who have three English A.P. credits. It may be used to satisfy either the humanities distribution requirement or the Freshman Seminar requirement, but not both. Recommended for English majors.

**271 The Reading of Poetry** Fall and spring. 3 credits. Register with the English department at Barton Hall, not at Freshman Seminar registration.

Fall: M W F 1:25 or T R 10:10, J. Stallworthy, C. Levy; spring: staff.

Designed to sharpen the student's powers to understand and respond to poetry. Readings in the major periods, modes, and genres of poetry written in English. Students will write several short critical essays totaling approximately thirty pages. This course is open to sophomores, and to freshmen who have taken a Freshman Seminar or who have three English A.P. credits. It may be used to satisfy either

the humanities requirement or the Freshman Seminar requirement, but not both. Recommended for English majors.

**272 An Introduction to Drama** Fall and spring. 3 credits. Register with the English department at Barton Hall, not at Freshman Seminar registration.

Fall: M W F 11:15 or 1:25. A. Caputi, R. Farrell; spring: T. Murray.

A study of selected masterworks by such playwrights as Sophocles, Ibsen, and Shaw to introduce the student to the chief idioms and styles of the Western dramatic tradition. The work will consist of discussions and papers as well as a special project related to the plays being produced by the Department of Theatre Arts. The course is open to sophomores, and to freshmen who have taken a Freshman Seminar or who have three English A.P. credits. It may be used to satisfy either the humanities requirement or the Freshman Seminar requirement, but not both. Recommended for English majors.

## German Literature

For full descriptions of the following courses see German Literature, p. 157. For spring class schedules see Freshman Seminar publications.

**109 Folk Tales and Folk Poetry** Fall and spring. 3 credits.

Fall: M W F 8 or T R 8:40. I. Ezergailis, V. Healy, P. Nelson, D. Rush.

**151 Kafka, Hesse, Brecht, and Mann** Fall and spring. 3 credits.

Fall: T R 8:40-9:55. B. Foust, E. Reeves.

**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 Seminar requirement but not both.  
T R 2:30-4:30. H. Deinert.

## Government

For descriptions of Freshman Seminars offered in the spring by the Department of Government consult the Freshman Seminar brochure.

**100.1 International Energy Problems and Interdependence** Fall. 3 credits.

T R 10:10. L. Scheinman.

This seminar will examine international energy problems in the context of the concept of interdependence. Attention will be given to the roots of the energy problem and to the evolution of energy sources from abundance to scarcity to apparent renewed abundance (especially oil), the political dynamics of energy supply and demand, and the development of energy security policies among the advanced industrial states.

**100.2 The Empire Strikes Back: Assessing the Myth and Reality of the Japanese Challenge** Fall. 3 credits.

M W F 9:05. H. R. Friman.

Is Japan economic evil incarnate, the new #1 to be emulated by the rest of the world, or just a scapegoat for U.S. economic problems? This course will examine United States-Japan relations in light of recent trade disputes between the two countries. Emphasis will be placed on analyzing Japan's "economic miracle," Japan, Inc., Japanese business techniques, domestic political constraints on economics in the U.S. and Japan, and the international implications of U.S.-Japan trade friction.

**100.3 The Family and Social Policy** Fall. 3 credits.

M W F 10:10. J. Drew.

Ten to fifteen percent of American teenagers have experienced child abuse and neglect during their developmental years. These children could be protected through increased public intervention in family life, but widely held social norms inhibit this approach. The course will explore the norms and structures of family life. It will use a variety of sources to explore the historic, scientific, and political forces that change and maintain these norms.

**100.4 Socialist Governance: Myth or Reality?** Fall. 3 credits.

M W F 10:10. L. Wozniak.

The recent ascension to power of the socialist parties in France, Sweden, Greece, and Spain suggests that socialism is on the rise in Western Europe. This seminar will introduce the notion of socialism and will analyze postwar European socialist policies. We will try to determine if governing socialist parties can indeed implement their platforms.

**100.5 Politics and the Environment** Fall. 3 credits.

M W F 11:15. K. Wagner-Johnson.

The decade of the 1970s left a legacy of environmental laws and national commitments to the task of achieving and maintaining a healthy environment. Many of these achievements are undergoing political and economic challenges in the 1980s. This course will explore the political choices involved in environmental issues, past and present, but especially since 1970. The historical-philosophical bases of contemporary attitudes toward the environment, the environmental movement, the major environmental laws, and the evolution of the Environmental Protection Agency will be examined. Special attention will be given to the formulation of environmental policies, including the use of technical data and cost-benefit analysis. The course will also consider the effect of environmental action on the Congress, the executive departments, and the courts.

**100.6 Theories of International Peace** Fall. 3 credits.

M W F 11:15. J. Kroll.

We will examine theories that explain how and when international peace can be achieved. They will include political theories (works of Kant, Marx), institutional explanations (the League of Nations, the United Nations), antipolitical theories (functionalism, controlled communication), economic theories (works of Smith, Ricardo), and realist theories (deterrence, balance of power). The key questions to be raised are: What is the value of these theories for promoting peace? Why did so many of them fail to achieve their goals?

**100.7 Political Interpretations of Contemporary Afro-American Culture** Fall. 3 credits.

M W F 9:05. L. Mason.

In this course we will examine selected biographies and novels to gather an understanding of the political development of Afro-Americans during the twentieth century. How has the Afro-American's culture reflected his political development from the turn of the century through migration and the rebirth of black nationalism? How should we view the Harlem Renaissance period and Afro-American responses to socialism in the 1930s and 1940s? We will also cover the civil rights movement, the third appearance of nationalism, and black feminism. Some of the authors whose works we will study are W. E. B. DuBois, Harold Cruse, Marcus Garvey, Malcolm X, Zora Neal Hurston, Richard Wright, Ralph Ellison, Alice Walker, and Martin Luther King, Jr.

**100.9 Politics of Islam** Fall. 3 credits.

M W F 10:10. F. Haq.

Different manifestations of political Islam have emerged more or less simultaneously in several Muslim countries. This course will deal with two such

manifestations, "Islamic revolution" in Iran and "Islamization" of the state in Pakistan. We will concentrate on the following questions: What are the causes and nature of Islamic resurgence? Is it a purely religious revival or a social and political movement that should be understood in the context of economic and social conditions of Muslim countries? What are the social classes to whom Islamic groups appeal the most? Will this resurgence lead to the establishment of an Islamic sociopolitical order, or will it become just another instrument of struggle between Muslim ruling elites and their opposition? Finally, if the Islamic sociopolitical goal is achieved, what would be its implications for women's rights, for foreign policy, and for political and economic development of these countries?

**100.10 The Military as Government** Fall. 3 credits.

M W F 11:15. C. Schneider.

In the Western world, civilian governments appear to be the norm, yet in many parts of the world it is the armed forces that rule. What happens when soldiers become rulers? In this course we will look at a variety of countries in which the military has assumed power and examine the effects of the military's ascent to power on social and political institutions, the society as a whole, and the military itself.

## History

**104 Communes and Utopias: Alternative Life Styles in American History** Fall. 3 credits. Limited to 15 students.

M W 2:30. G. C. Altschuler.

**105 Freshman Seminar: The Growth of Political Democracy in the United States** Fall. 3 credits.

Prerequisite: permission of instructor.

M 2:30. J. H. Silbey.

**106 Democracy and Education: History of Learning In America** Spring. 3 credits

M W 2:30. G. C. Altschuler.

**119 History of North American Indians** Spring. 3 credits. Prerequisite: permission of instructor.

R 2:30-4:25. D. H. Usner.

**143 Family and Community in Modernizing Societies** Spring. 3 credits.

M W 10:10-11:25. N. Schwartzbach.

**160 The Politics of Natural Man** Spring. 3 credits.

M W F 9:05. J. Oakley.

**176 Britain and the Second World War** Spring. 3 credits. Prerequisite: permission of instructor.

T 3:35, R 2:30-4:30. D. A. Baugh.

**193 China and the West before Imperialism**

Spring. 3 credits. Open to freshmen and sophomores. Prerequisite: permission of instructor.

T R 1:25-2:35. C. A. Peterson.

## History of Art

For full descriptions of the following courses see History of Art, p. 144.

**103 Freshman Seminar in Visual Analysis** Fall or spring. 3 credits.

Fall: M W F 10:10 or 11:15, or T R 10:10-11:25 or 12:20-1:35. Spring: M W F 9:05, 10:10, or 11:25, or T R 10:10-11:25. N. Pendergast, S. Clancy, M. Grillo, H. Biglari.

**104 How to Look at Works of Art** Fall. 3 credits. Not open to students who have taken History of Art 103.

T R 12:20-1:35. L. Meixner.

## Hotel Administration

For a full description of the following course see Hotel Administration, Communication Courses, p. 289.

**165 Introduction to Writing for Business** Fall and spring. 3 credits. Each section limited to 20 students.

Fall: M W F 9:05, 10:10, or 11:15, or M W 1:25 and F 9:05, or M W 2:30 and F 11:15. D. A. Jameson, D. G. Flash, J. F. Lumley, C. Solomon. Spring: consult Freshman Seminar Program publications.

## Medieval Studies

For full descriptions of the following courses and for spring class schedules see Medieval Studies, p. 211.

**101 The Literary Adventure of the Middle Ages**

Fall and spring. 3 credits.

Fall: T R 8:40-9:55. S. McEntire.

**102 King Arthur and His Knights** Fall and spring. 3 credits.

Fall: M W F 9:05, 12:20, or 1:25, or T R 12:20-1:35. P. Remley, K. Wickham-Crowley, K. Marti, S. Farrier.

## Modern Languages and Linguistics

## English

For a full course description see Modern Languages, Literatures, and Linguistics, English, p. 153.

**215-216 English for Later Bilinguals** 215, fall; 216, spring. 3 credits each term. Not designed for students whose schooling has been entirely in English.

M W F 2:30. M. Martin.

## Linguistics

For a full course description see Modern Languages, Literatures, and Linguistics, Linguistics, p. 162.

**113-114 Hispanic Bilingualism** 113, fall; 114, spring. 3 credits each term. Not designed for students whose schooling has been entirely in English.

M W F 1:25. I. Almirall-Padamesee, D. F. Solá.

## Music

For a full course description see Music, p. 170.

**111 Sound, Sense, and Ideas** Fall or spring. 3 credits.

M W F 10:10 or 11:15. W. Schneider, C. Clark.

## Near Eastern Studies

For full descriptions of the following courses see Near Eastern Studies, p. 173.

**[125 Freshman Seminar In Biblical Literature: Heroes and Heroines of the Bible** Fall. 3 credits. Not offered 1983-84.]**154 Harems, Houris, and Hashish: Western Perceptions of the Middle East** Spring. 3 credits.

Consult Freshman Seminar Program publications for times. D. Powers.

**157 Of Oil, Arms, and Anguish: Aspects of Modern Arab Thought** Fall. 3 credits.

T R 12:20-1:35. P. Molan.

## Philosophy

For descriptions of Philosophy 100.1, 100.3, 100.4, 100.5, 100.7, and 100.8 consult the Freshman Seminar Program brochure. Past topics have included Contemporary Moral Problems, Economic Justice, Science and Pseudo-Science, The Nature and Existence of God, Theories of the Mind, Objectivity and Reality in Scientific Theorizing, among others.

**100.2 Dialogue and Dialectic** Fall. 3 credits

M W F 11:15. R. Stalnaker.

Beginning with Plato, many philosophers have chosen to write philosophy in dialogue form. In this seminar we will read a number of philosophical dialogues, both ancient and modern, as well as some philosophy written in contrasting forms. We will be concerned both with substantive issues discussed in the dialogues and with the role of the form in helping to bring out the dialectic of the arguments. Students will write about six short papers, some of them dialogues. Readings will be from Plato, Berkeley, Hume, and some contemporary writers.

**100.6 Some Puzzles** Fall. 3 credits.

T R 10:10. C. Ginet.

We will discuss five or six of the following well-known puzzles: Zeno's Paradoxes of Motion (the Racecourse, the Arrow, the Stadium), the Paradox of the Heap (or Sorites Paradox), the Paradox of the Liar, the Hangman's Paradox (or the Paradox of the Surprise Examination), the Prisoner's Dilemma, and Newcomb's Problem. They involve reasoning that is paradoxical in the sense that it seems clear there must be something wrong with the reasoning but it is very hard to say what is wrong. Besides being an intriguing exercise in itself, the study of such puzzles can show us interesting and important things about some of our basic concepts, such as those of space, time, motion, truth, knowledge, rational choice, and causation.

## Psychology

**119 The Psychology of Persuasive****Communication** Fall and spring. 3 credits.

T R 12:20-1:35. S. Matteo.

This course is designed to help students improve their writing skills while they learn about the process of attitude information and attitude change. In addition, the course requires that students learn and use SCRIPT, a computer-based word-processing system available at Cornell. Topics chosen for discussion will provide a survey of current theoretical and experimental approaches to the relationship between attitudes and behavior. Specific issues include the effects of advertising on consumer behavior, juror attitudes on trial outcome, political persuasion on voting, and racial-sexual prejudice on employment practices.

## Romance Studies

For a full description of the following course see French Literature, p. 154.

**109 Techniques of Interpretation: An Introduction to Semiotics (also French 109)** Fall and spring. 3 credits.

T R 8:40-9:55. K. Lockhart.

## Russian Literature

**103 Freshman Seminar: Classics of Russian Thought and Literature** Fall and spring. 3 credits each term.

T R 12:20. P. Sulzman.

Emphasis is on connections between Russian literary masterpieces and their historical background. The seminar covers both nineteenth- and twentieth-century works. Readings in English translation of Dostoevsky, Solzhenitsyn, and others.

**104 Freshman Seminar: Nineteenth-Century Russian Literary Masterpieces** Fall and spring. 3 credits.

M W F 9:05 or 12:20. P. Carden, L. Cariani.

Readings in English translation of works by Dostoevsky, Tolstoy, and others; limited to nineteenth-century authors. A slightly more literary and less historical course than Russian 103.

**105 Freshman Seminar: Twentieth-Century Russian Literary Masterpieces** Fall and spring. 3 credits.

T R 2:30-3:45. C. Ruder.

Readings in English translation of works by Babel, Pasternak, Solzhenitsyn, and others, studied against the background of Soviet social and political developments.

## Society for the Humanities

For full descriptions of the following courses see Society for the Humanities, p. 212.

**101 Science as Literature: Science as *Metier*** Fall and spring. 3 credits.

T R 10:10-11:25. J. Lumley.

**102 Science as Literature: The Impact of Science on Self-Image** Spring. 3 credits.

M W F 9:05. J. Lumley.

## Sociology

For full descriptions of the following courses see Sociology, p. 188.

**[100.1 Science in Society: A Sociological Perspective** Fall. 3 credits. Not offered 1983-84.]**100.2 The Social Order in Detective Fiction** Spring. 3 credits.

M W 8:40. S. Caldwell.

**100.3 Sociology of Organizations** Spring. 3 credits.

M W F 9:05. D. Fish.

**100.5 Hard Choices (also Biology and Society****102)** Fall and spring. 3 credits.

M W F 11:15. S. Siskin.

**105 Opinion-Forming Institutions** Fall. 3 credits.

R. K. Goldsen.

The unifying topic of the seminar is the societal impact of mass media. Focus of attention is how to study, observe, understand, and write about them. Principles of clear expository writing are studied and applied in weekly exercises reviewed and edited by professor, staff, and class.

**109 Social change** Fall. 3 credits.

T R 2:30. B. Rubin.

## Theatre Arts

For full descriptions of the following courses see Theatre Arts, p. 194.

**108 Writing about Film (also English 108)** Fall and spring. 3 credits.

T R 12:20-1:35. Fall: H. Knode; spring: staff.

**120 Writing about the Modern Theatre** Spring. 3 credits.

T R 12:20-1:35. Staff.

**140 From Script to Stage: Writing about the Theatrical Process** Fall and spring. 3 credits.

Fall: M W F 9:05 or 1:25; spring: M W F 9:05. Staff.

## Women's Studies

See Freshman Seminar brochure.

## Writing

**137-138 Workshops in English Composition** 137, fall; 138, spring. 3 credits each term. S-U grades only.

Hours to be arranged. N. Kaplan. D. Crabtree, K. Hjortshoj, J. Martin.

Designed for students who have had little or no training in composition and for those who are experiencing serious difficulties with their writing

assignments in other courses. Instruction takes place in small, intensive group sessions and in individual conferences. Students who feel they may need this kind of intensive work should attend a writing assessment session during orientation week or call 256-6349 to make an appointment with a member of the Writing Workshop staff.

## Human Biology Program

J. Haas (nutritional sciences), director, N206 Martha Van Rensselaer Hall, 256-8001; R. Dyson-Hudson (anthropology), B. Finlay (psychology), G. Hausfater (neurobiology and behavior), J. Fortune (physiology/women's studies), R. Johnston (psychology), K. A. R. Kennedy (ecology and systematics), D. Levitsky (nutritional sciences), R. Savin-Williams (human development and family studies)

Human Biology integrates the methods and theories of many disciplines, such as biological anthropology, nutrition, neurobiology, 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 into 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 insure 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 207-208 or 215-216 or 103-104); one year of college mathematics, including at least one semester of calculus (Mathematics 111-112 or 113-112, or 105-106, or 111-105 or 113-105); at least one semester of organic chemistry lectures (Chemistry 253 or 357-358 or 359-360); one course in genetics (Biological Sciences 281 or 282); one course in biochemistry (Biological Sciences 330 or 331); two semesters of physics (Physics 207-208 or 112-213-214 or 101-102). 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 or others that are listed in the brochure available to students upon request.

There is no foreign language requirement for Human Biology above that 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 Human Biology to be the 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 The Vertebrates** Spring. 5 credits.

**Bio S 311 Introductory Animal Physiology, Lectures (also Veterinary Medicine 346)** Fall. 3 credits.

**Bio S 414 Vertebrate Morphology (also Veterinary Medicine 700)** Spring. 3 credits.

**Bio S 474 Laboratory and Field Methods in Human Biology** Spring. 4 credits.

**NS 115 Ecology of Human Nutrition and Food** Fall or spring. 3 credits.

**NS 222 Maternal and Child Nutrition** Spring. 3 credits.

**NS 331 Physiological and Biochemical Basis of Human Nutrition** Spring. 3 credits.

**NS 347 Human Growth and Development: Biological and Social Psychological Considerations (also Human Development and Family Studies 347)** Spring. 3 credits.

**NS 361 Biochemistry and Human 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 324 Biopsychology Laboratory (also Biological Sciences 324)** Spring. 3 credits.

**Psych 425 Brain and Behavior** Fall. 3 or 4 credits.

**Vet M 331 Medical Parasitology** Fall. 2 credits.

### Human Behavior

**Anthr 221 Human Biology: Variation and Adaptations of Contemporary Populations** Fall. 4 credits.

**Anthr 476 Human Behavior in Anthropological Perspective** Fall. 4 credits.

**Bio S 301 Biology and Society I: The Biocultural Perspective (also Anthropology 301 and Biology and Society 301)** Fall. 3 or 4 credits.

**Bio S 424 Animal Social Behavior** Spring. 3 credits.

**HDFS 212 Early Adolescence: A Biological Approach** Fall. 3 credits.

**HDFS 315 Human Sexuality: A Biosocial Perspective (also Human Service Studies 315)** Fall, spring, or summer. 3 credits.

**NS 325 Sociocultural Aspects of Food and Nutrition** Fall. 2 credits.

**NS 347 Human Growth and Development: Biological and Social Psychological Considerations (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.

**Soc 230 Population Problems** Spring. 4 credits.

**Soc 430 Social Demography** Spring. 4 credits.

### Human Evolution and Ecology

**Anthr 114 Humankind: The Biological Background** Fall. 3 credits.

**Anthr 221 Human Biology: Variation and Adaptations of Contemporary Populations** Fall. 4 credits.

**Anthr 375 Ecology and Human Biology** Spring. 4 credits.

**Anthr 476 Human Behavior in Evolutionary Perspective** Fall. 4 credits.

**Anthr 677 Seminar in Ecological Anthropology: Food Production and Social Organization** Spring. 4 credits.

**Bio S 260 Introductory Ecology** Fall or spring. 3 credits.

**Bio S 301 Biology and Society I: The Biocultural Perspective** Fall. 3 or 4 credits.

**Bio S 371 Human Paleontology** Fall. 4 credits.

**Bio S 468 Systems Ecology** Spring. 4 credits.

**Bio S 477 Organic Evolution** Fall. 4 credits.

**Bio S 479 Physical Anthropology: History and Theory** Fall. 2 credits.

**Bio S 481 Population Genetics** Spring. 4 credits.

**B & Soc 404 Energy and Ecological Systems** Fall. 3 credits.

**Psych 326 Evolution of Human Behavior** Fall. 4 credits.

**Soc 230 Population Problems** Spring. 3 credits.

**Soc 430 Social Demography** Spring. 4 credits.

**Soc 431 Techniques of Demographic Analysis** Fall. 4 credits.

**Vet M 331 Medical Parasitology** Fall. 2 credits.

**Vet M 664 Introduction to Epidemiology** Fall. 3 credits.

## Independent Major Program

Dean Lynne Abel, director, 134 Goldwin Smith Hall, 256-3386

The Independent Major Program is described in the introductory section, pp. 96-97.

**351 Independent Study** Fall or spring. 1-4 credits. Prerequisite: permission of the program office.

**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.

## International Relations

One of the University's strongest, most diverse fields is international relations. Cornell offers dozens of courses, in many departments and several colleges, that provide a strong education in the field, including courses in government, economics, history, anthropology, rural sociology, nutrition, modern languages and literatures, international comparative labor relations, and many others too numerous to list and keep current.

## The Concentration

R. Rosecrance, director, Center for International Studies, 170 Uris Hall

The purpose of a concentration is to provide a structure for students who have a general interest in the field or who plan 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: history, government, economics, foreign literature, and so on. Others will design an independent major. Still others will major in a different discipline, perhaps altogether unrelated, but would like to have a basic understanding of international problems.

For students in any of these categories, the requirements for a *concentration in international relations* are the following six courses or options:

- 1) Government 181, Introduction to International Relations
- 2) One appropriate 300-level government course, either in international relations or in the foreign policy of a particular nation
- \*3) Economics 361, International Trade Theory
- \*4) Economics 362, International Monetary Theory
- 5) History 314, History of American Foreign Policy II
- 6) Any history course dealing with a modern nation

\*Numbers 3 and 4 can be replaced by choosing two courses from the following:

- a) Economics 371, Public Policy and Economic Development
- b) Economics 372, Applied Economic Development



- c) Economics 373, International Specialization and Economic Development
- d) Economics 374, National and International Food Economics

The typical choices among the sequences listed above would be to study European history and government with Economics 361-362 or Third World history and government with Economics 371-374. Reasonable substitutions can also be arranged.

Students are also urged as strongly as possible to acquire full proficiency in, not merely a passing acquaintance with, a modern foreign language. Studying the literature as well as the language of a culture is important. Since, however, students will begin the concentration with varying backgrounds in language and since *proficiency* is the minimal expectation, no required number of courses is specified.

Students electing the international relations concentration will be assigned an adviser in that field, if appropriate, in addition to their departmental adviser. They should see Professor Richard Rosecrance, Center for International Studies, 170 Uris Hall.

### Center for International Studies

See Interdisciplinary Centers and Programs, p. 9.

### Program of Jewish Studies

D. I. Owen, director and undergraduate adviser (Near Eastern and ancient Jewish history and archaeology), S. Bacharach (industrial and labor relations, sociology, Jewish thought and social theory), M.F. Collins (Bible, Dead Sea Scrolls, apocryphal and rabbinic literature), W. J. Dannhauser (Jews and Germans, contemporary Jewish thought, Gershom Scholem), S. L. Gilman (Yiddish literature, German-Jewish history and literature), G. Korman (Holocaust studies, Jewish labor history), C. Kronfeld (Hebrew language, Hebrew and Yiddish literature), A. S. Lieberman (physical geography and natural history of Israel), D. S. Powers, (History of Jews in Islamic lands), E. Rosenberg (Jews in modern European and Anglo-American literature).

The Program of Jewish Studies is an outgrowth of the Department of Near Eastern Studies. 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.

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 Hebrew literature; modern Jewish thought; modern Hebrew literature; ancient, medieval, and modern Jewish history; and Yiddish language and literature. In some of these fields students may take courses both on graduate and undergraduate levels. Faculty in other departments provide additional breadth to the program by offering courses in related areas of study.

#### Courses offered 1983-84

**Elementary Modern Hebrew I and II (Near Eastern Studies 101-102)**

**Elementary Modern Hebrew (Near Eastern Studies 103)** Summer

**Elementary Classical Hebrew (Near Eastern Studies 121-122)**

**Intermediate Modern Hebrew (Near Eastern Studies 201-202)**

**Masterpieces of Jewish Literature (Near Eastern Studies 205 and Comparative Literature 205)**

**The Holocaust: European Jewry, 1933-1945 (Near Eastern Studies 241)** Summer

**Ancient Seafaring (Near Eastern Studies 261 and Archaeology 275)**

**Modern History of the Middle East: Changing Politics, Society, and Ideas (Near Eastern Studies 294 and Government 358)**

**Advanced Modern Hebrew I and II (Near Eastern Studies 301-302)**

**Ancient Near Eastern Literature (Near Eastern Studies 332)**

**Special Topics In Near Eastern Studies (Near Eastern Studies 341-342)**

**Jews of Arab Lands (Near Eastern Studies 346)**

**The History and Archaeology of Ebla (Near Eastern Studies 362)**

**Introduction to Field Archaeology in Israel (Near Eastern Studies 364)** Summer

**The History and Archaeology of the Divided Monarchy from the Death of Solomon to the Destruction of Jerusalem, 922-586 B.C.E. (Near Eastern Studies 365)**

**The History and Archaeology of the Ancient Near East (Near Eastern Studies 366 and Archaeology 310)**

**Parents and Children In Athens and Jerusalem (Near Eastern Studies 391-392, Society of Humanities 381-382, and History 381-382)**

**Seminar in Contemporary Near Eastern Society (Near Eastern Studies 398 and Government 352)**

**The Poetics of Modernism in Literature and Art: Paris, New York, Tel Aviv (Near Eastern Studies 402 and Comparative Literature 402)**

**Independent Study, Undergraduate Level (Near Eastern Studies 491-492)**

**Independent Study Honors Seminar (Near Eastern Studies 499)**

**Independent Study, Graduate Level (Near Eastern Studies 691-692)**

#### Courses Not Offered 1983-84

**Freshman Seminar In Biblical Literature: Heroes and Heroines of the Bible (Near Eastern Studies 125)**

**Introduction to the Turkish Language (Near Eastern Studies 131-132)**

**Elementary Yiddish (Near Eastern Studies 171-172)**

**Modern Hebrew Literature in Translation: Modern Hebrew Poetry (Near Eastern Studies 207)**

**Modern Hebrew Literature in Translation: The Modern Hebrew Short Story (Near Eastern Studies 208)**

**Readings in Classical Hebrew Literature: The Art of Biblical Narrative (Near Eastern Studies 221-222)**

**Judaic Literature in Late Antiquity (Near Eastern Studies 225)**

**Aramaic (Near Eastern Studies 238)**

**The History and Archaeology of Ancient Israel to 450 B.C.E. (Near Eastern Studies 243)**

**The Emergence of the Modern Jew: 1648-1948 (Near Eastern Studies 245)**

**Introduction to Biblical Archaeology (Near Eastern Studies 263)**

**Tradition and the Literary Imagination (Near Eastern Studies 291)**

**The Hebrew Literary Imagination (Near Eastern Studies 292)**

**Seminar in Modern Hebrew Literature: The Short Story (Near Eastern Studies 303)**

**Seminar in Modern Hebrew Literature: The Novel (Near Eastern Studies 304)**

**Agnon and Hazaz (Near Eastern Studies 308)**

**Undergraduate Seminar in Biblical Literature: Prophecy in Ancient Israel (Near Eastern Studies 322)**

**Ugaritic (Near Eastern Studies 337)**

**Biblical Interpretation in Rabbinic Literature (Near Eastern Studies 342)**

**Age of the Patriarchs (Near Eastern Studies 344)**

**Interconnections In the Eastern Mediterranean World in Antiquity (Near Eastern Studies 361)**

**The History and Culture of Ancient Mesopotamia (Near Eastern Studies 363)**

**History of the Ancient Near East in Biblical Times (Near Eastern Studies 365)**

**The History and Archaeology of Ancient Egypt (Near Eastern Studies 367)**

**Yiddish Literature in Translation (German Literature 350 and Near Eastern Studies 373)**

**The Shtetl in Modern Yiddish Fiction In English Translation (German Literature 375 and Near Eastern Studies 375)**

**Topics in Yiddish Literature (German Literature 377 and Near Eastern Studies 377)**

**Jewish Workers in Europe and America 1789-1948 (Industrial and Labor Relations 381 and Near Eastern Studies 381)**

**Metaphor, Modernism, and Cultural Context: The Use of Metaphor in Modernist Hebrew, Yiddish, English, and American Poetry (Near Eastern Studies 405 and Comparative Literature 405)**

**Seminar in Syro-Palestinian Archaeology: The Israelite Conquest of Canaan (Near Eastern Studies 461)**

## Latin American Studies

T. H. Holloway, director; S. Barraclough, T. Davis, B. Edmonston, D. Freebairn, P. Garrett, R. Golden, W. Goldsmith, C. Greenhouse, J. Haas, D. Hazen, J. Henderson, B. J. Isbell, E. Kenworthy, T. Lynch, R. McDowell, O. Mitchell, C. Morris, T. Poleman, B. Rosen, D. Sanjur, E. M. Santl, D. Solá, J. M. Stycos, M. Suñer, H. D. Thurston, J. Tittler, A. Van Wambeke, W. Whyte, L. Williams, F. 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 a Latin American concentration or 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 students should contact the program office, 190 Uris Hall.

## Law and Society

J. Bennett (philosophy), C. Carmichael (comparative literature), C. Greenhouse (anthropology), G. Hay (economics), C. Holmes (history), M. Katzenstein (government), J. Rabkin (government), D. B. Lyons (philosophy), M. B. Norton (history), D. Powers (Near Eastern studies), D. T. Regan (psychology)

The Law and Society Program is an interdisciplinary concentration for undergraduates who are interested in the law from the perspectives of the social sciences and the humanities: anthropology, comparative literature, economics, government, history, philosophy, psychology, and sociology. Students who wish to graduate with a concentration in law and society should consult one of the advisers listed above to develop a coherent program of study, including at least four courses from the law and society list of courses.

**[Anthropology 328 Law and Culture]**

**[Anthropology 329 Politics and Culture]**

**[Anthropology 627 Legal Anthropology]**

**Economics 354 Economics of Regulations**

**Government 300.3 Recent Theories of Justice**

**Government 313 The Nature, Functions, and Limits of Law**

**Government 322 Criminal Justice**

**Government 323 The "Fourth" Branch**

**Government 328 Constitutional Politics: The United States Supreme Court**

**Government 353 The Feminist Movement and Public Policy**

**Government 364 Liberty, Equality, and Social Order**

**Government 389 International Law**

**Government 457 Comparative Public Law: Legal Controls on Government in Europe and America**

**History 275 Crime and Punishment: From the Puritans to Mickey Spillane**

**[History 359 The Early Development of Anglo-American Common Law]**

**History 430 Law and Authority in America: Freedom, Restraint, and Judgment**

**Philosophy 342 Law, Society, and Morality**

**Philosophy 441 Contemporary Ethical Theory**

**Philosophy 444 (also Law 720) Contemporary Legal Theory**

## 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 science. 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, 275 Olin 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.

## Medieval Studies

A. B. Groos, director; B. B. Adams, F. M. Ahl, V. T. Bjarnar, R. G. Calkins, A. M. Colby-Hall, R. T. Farrell, J. C. Harris, T. D. Hill, J. H. Jasanoff, J. J. John, R. E. Kaske, N. Kretzmann, G. Mazzotta, G. M. Messing, P. D. Molan, C. Morón-Arroyo, J. M. Najemy, D. S. Powers, D. M. Randel, B. Tierney, F. van Coetsem

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 medieval Irish and Welsh; Old Provençal and medieval French; medieval Spanish and Italian; Old Saxon, Old High German, Middle High German, Gothic, Old Norse (Old Icelandic), and Old Russian; 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 wish to undertake an independent major or a concentration in medieval studies should consult the director of the program, Professor Groos, 77 Goldwin Smith Hall.

Information for prospective graduate students is contained in the *Announcement of the Graduate School* and in a brochure on medieval studies, which can be obtained from the director.

## Freshman Seminars

**101 The Literary Adventure of the Middle Ages**  
Fall and spring. 3 credits.

Hours to be arranged. Staff.  
The legendary figures and fantastic worlds of medieval literature have entranced audiences throughout the centuries. Readings in English translation will explore works of the heroic and courtly ages, investigating such themes as the nature of the epic hero and his society (*Beowulf*, Icelandic sagas, the *Nibelungenlied*), the development of the courtly hero and lover (Arthurian romances), and the sophisticated treatment of the human comedy (*Sir Gawain and the Green Knight* or Chaucer's

*Canterbury Tales*). A "medieval" work by a modern author (J. R. R. Tolkien, C. S. Lewis, or John Gardner) will also be included.

**102 King Arthur and His Knights** Fall and spring. 3 credits.

Hours to be arranged. Staff.  
King Arthur and the knights of the round table inspired the best-selling literature of medieval Europe and remain a popular subject today. This course explores the Arthurian legend in medieval literature and at least one modern work (usually Mark Twain's *Connecticut Yankee* or a romance of T. H. White). Readings in English are chosen from the *Lais* of Marie de France, romances of Chrétien de Troyes, the quest for the Holy Grail (*Parzival*), the legend of Tristan and Isolde, *Sir Gawain and the Green Knight*, and Malory's *Morte d'Arthur*. Discussions will investigate fundamental problems raised by these stories: the individual in society, the development of the hero, the nature of love, and the dilemma of religious ideals in a secular world.

## Graduate Seminars

**601 Graduate Seminar** Fall. 4 credits.  
M 3:35. A. Groos.  
Topic: Arthurian romance.

**602 Graduate Seminar** Spring. 4 credits.  
Hours to be arranged. Staff.  
Topic to be announced.

## Related Courses

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 Literatures (including German Literature, Romance Studies, and Russian Literature), Music, Near Eastern Studies, Philosophy, and the Society for the Humanities. An up-to-date listing of the courses offered in each term will be made available at the office of Medieval Studies as soon as the *Course and Time Roster* is published.

## Religious Studies

N. Kretzmann, chairman; C. M. Arroyo, R. Baer, J. Bishop, J. Boon, R. Calkins, C. Carmichael, K. Clinton, M. Colacurcio, M. Collins, A. Grapard, J. John, T. Kirsch, S. O'Connor, D. Owen, D. Powers, D. Randel, C. Strout, B. Tierney, A. Wood

Religious studies is an interdisciplinary program reflecting a wide variety of academic interests and disciplines. The intention of the program is to provide a formal structure for the study of the religions of mankind at the undergraduate level. A student may fulfill the requirement for a concentration in religious studies by completing a minimum of four courses that have been approved by an adviser in the area of concentration. The program is administered by a committee. The chairman is Professor Kretzmann, 320 Goldwin Smith Hall.

Courses in religious studies currently offered include the following.

**Natural Resources 407 Religion, Ethics, and the Environment** Spring. 3 credits.  
R. Baer.

**Comparative Literature 429 Readings in the New Testament** Fall. 4 credits.  
J. Bishop.

**Comparative Literature 326 Christianity and Judaism** Spring. 4 credits.  
C. Carmichael.

**Comparative Literature 328 Literature of the Old Testament** Fall. 4 credits.  
C. Carmichael.

**Comparative Literature 328 Old Testament Seminar** Fall. 4 credits.  
C. Carmichael.

**Anthropology 322 Comparative Religious Systems** Spring. 4 credits.  
T. Kirsch.

**Anthropology 619 Anthropological Approaches to the Study of Buddhism in Asia** Fall. 4 credits.  
T. Kirsch.

**[Philosophy 263 Reason and Religion]** Fall. 4 credits. Not offered 1983-84.  
N. Kretzmann.]

**Near Eastern Studies 332 Ancient Near Eastern Literature** Spring. 4 credits.  
D. Owen.

**Near Eastern Studies 361 Interconnections in the Eastern Mediterranean in Antiquity** Fall. 4 credits.  
D. Owen.

**Near Eastern Studies 356 Jews of Moslem Lands** Spring. 4 credits.  
D. Powers.

**History 367 Church and State in the Middle Ages** Fall. 4 credits.  
B. Tierney.

**Near Eastern Studies 221 The Art of Biblical Narrative** Fall. 4 credits.  
Staff.

### Russian and Soviet Studies Major

W. M. Pintner, chairman; A. Senkevitch (architectural history); M. G. Clark, G. J. Staller, J. Svejnar, J. Vanek (economics); M. Rush, (government); W. M. Pintner (history); W. W. Austin (music); U. Bronfenbrenner (psychology); P. Carden, C. Emerson, G. Gibian, S. Senderovich, A. Zholkovsky (Russian literature); L. H. Babby, E. W. Browne III, R. L. Leed, (Slavic linguistics)

The major in Russian and Soviet studies has the following requirements:

- 1) Qualification in Russian.
- 2) At least one course relating to Russia, at the 200 level or above, in each of the following departments: government, economics, history, and Russian literature. (A course in another department may be substituted for one of the above with the consent of the major adviser.)
- 3) At least three additional courses, at the 300 level or above, in one of the following departments: government, history, economics, or Russian literature. These courses are selected in consultation with the student's adviser and are to be approved as appropriate for a major in Russian and Soviet studies.

The chairman of the committee will serve as adviser for all majors, but each student should also designate an additional adviser in the department in which his or her work is concentrated.

### Social Relations Major

R. M. Williams, Jr., director of undergraduate studies, 342 Uris Hall, 256-4266

The major in social relations is offered jointly by the Department of Anthropology and the Department of Sociology. It provides the student with basic competence in cultural anthropology, social psychology, and sociology and gives particular emphasis to the common methods of research in these disciplines. The student is expected to obtain a grasp of the common interests and unique insights of the three disciplines, and in the senior Social Relations Seminar is expected to integrate aspects of their theory and data.

Students seeking admission to the program should have completed the following prerequisites: (a) Sociology 101, Sociology 201, or Anthropology 201; (b) either Psychology 101 or 280 or Sociology 280; and (c) either Sociology 301 or Industrial and Labor Relations 210 or an equivalent course in statistics.

### The Major

The major calls for a minimum of 36 credits of course work as follows:

- 1) three pairs or other combinations of related courses at the 300 level or above, to be selected in consultation with the major adviser (these six courses must include two courses from each of the following disciplines: anthropology, social psychology, sociology);
- 2) at least one course in methods, to be selected from the following: anthropological methods, techniques of experimentation (psychology), methods in sociology, advanced psychological statistics, philosophy of science or of social science, or advanced statistics (such as Industrial and Labor Relations 311);
- 3) at least one course in theory related to social relations; and
- 4) the senior seminar in social relations (Sociology 497 or Anthropology 495).

A list of the courses that may be used to satisfy the requirements for a major in social relations is available from any of the major advisers.

### Society for the Humanities

(A. D. White Center for the Humanities, 27 East Avenue.)

Eric A. Blackall, director. Fellows for 1983-84: Frederick M. Ahl (Cornell University), Phyllis Pray Bober (Bryn Mawr College), Christine Brousseau (Harvard University), Fritz Graf (University of Zurich), James J. John (Cornell University), Victoria Kahn (Bennington College), Judith Koffler (Pace University School of Law), John Murdoch (Harvard University), Annabel Patterson (University of Maryland)

The Society awards annual fellowships for research in the humanities in three categories: senior fellowships, faculty fellowships, and junior postdoctoral fellowships. The Fellows offer, in line with their research, informal seminars intended to be exploratory or interdisciplinary. Unlike other courses, the seminars offered by the Society begin the second week of each semester. These seminars are open to graduate students and suitably qualified undergraduates. Students wishing to attend should telephone the Society (256-4725) early in the first week of the term to arrange a short interview with the Fellow offering the course. There are no examinations, and it is at the discretion of the Fellow whether to require only oral reports or, in addition, a research paper. Students wishing credit for the course should formally register in their own college. Persons other than those officially enrolled may attend as visitors with permission of the Fellow.

The Society's focal theme during the 1983-84 year will be the classical tradition from antiquity through the Renaissance.

### Frederick G. Marcham Scholar Program.

Each year the Frederick G. Marcham Scholar Program supports a special seminar program (Society for the Humanities 381-382).

**101 Science as Literature: Science as Metier** Fall and spring. 3 credits. Freshman Seminar.

T R 10:10 J. Lumley.  
Robert Ornstein claims that science turns the impossible into the boring. Einstein contends that science, in its purest form, uncovers "the grandeur of reason incarnate in existence." In readings ranging from Darwin to Einstein to Asimov, we shall try to discover how a discipline can be so variously defined and described.

**102 Science as Literature: The Impact of Science on Self-Image** Spring. 3 credits. Freshman Seminar.  
M W F 9:05 J. Lumley.

Man's rational perception of his place in nature frequently clashes with his emotional need to elevate himself above nature. In the last 350 years science has had the uncomfortable habit of dethroning him as master of the universe. In this course, with readings from Galileo, Darwin, Freud, and others, we shall follow man's journey from a position of dominance in a geocentric, divinely ordered universe to that of a genetically programmed organism in a decaying biosystem. We shall examine how well, or how completely, he has accommodated his dreams to the new worlds born of science.

**381-382 Parents and Children in Athens and Jerusalem (also History 381-382 and Near Eastern Studies 391-392) The Frederick G. Marcham Seminar.** 381, fall; 382, spring. 4 credits each term. Enrollment limited. Permission of instructor required.

Fall: W 2:30-4:30; spring: irregular class meetings. In spring students will pursue independent work in consultation with the instructors, and the class will meet for special events and presentations by class members. C. Kronfeld, B. Strauss.

The focus is on the images and reality of parent-child relations in ancient Athens and Israel, with masterpieces of these two central Mediterranean cultures serving as main texts. Questions to be examined both from the historian's and from the literary critic's point of view include parenthood in the Homeric epic and in Biblical narrative, generation gap and the tension between emulation and rebellion, gender stereotypes of parent and child images, and the theme of war and child sacrifice. For comparative purposes attention will also be paid to the images of parent-child relations in modern Greece and Israel as well as in the Greek and Jewish diasporas. Students who wish to read the literature in the original languages will be supplied with appropriate texts.

**413 Virgil's Eclogues: Images of Cultural Change** Fall. 4 credits.

T 3:35-5:20. A. Patterson  
Virgil's *Eclogues* offer an unusual opportunity for reception study in that few classical texts have been so frequently edited, annotated, translated, imitated, and visually illustrated. The constant process of reinterpretation so documented is of great interest, not only in itself, but as it confirms or qualifies our standing assumptions about cultural history. The seminar will examine the major phases of reinterpretation, from early Renaissance humanism through high modernism, and will investigate the ways in which the ideological stimulus of Virgil's text was a factor in its survival. Authors or translators selected for special treatment will be Petrarch, Boccaccio, Sannazaro, Spenser, Milton, John Ogilby, Pope (and Philips), Wordsworth, Samuel Palmer, and Paul Valéry. The use of visual materials as a basis for discussion will be strongly encouraged.

**414 Figurative Arts of Antiquity in the Renaissance** Spring. 4 credits.

T 3:35-5:20. P. P. Bober.  
This seminar will address a number of questions concerning the uses of ancient art in the Renaissance: antiquarian concerns; artists' discrimination among varying types and representational modes; as well as programmatic collecting, with special reference to the history of Roman collections visited by Aldrovandi in 1549.

**415 The Myth of Orpheus** 4 credits.

M 3:35-5:20. F. Graf.  
The study of the key documents, both literary and archaeological, will establish the importance and development of the Orpheus myth in literature and religion of ancient Greece and Rome and introduce the more general problems of interpreting Greek myths. A more rapid survey of documents since antiquity will trace the forms that the myth assumed

when taken over into medieval and Renaissance art, literature, and music. The literary document study will be in Greek and Latin.

**416 A Pagan Saint: Philostratus' Life of Apollonios** Spring. 4 credits.

M 3:35-5:20. F. Graf.

Who was the historical Apollonios of Tyana? What were the forces and motivations behind his transformation into a "pagan saint"? What shapes did these transformations take? Through reading (in Greek) and analysis of selected parts of Philostratus' *Vita Apollonii*, we shall try to answer these questions, which, inevitably, lead us into some more general problems of later Greek and Roman religion.

**417 The Aristotelian Tradition in the Early and High Middle Ages** Fall. 4 credits.

W 3:35-5:20. J. Murdoch.

A study of the reception, preservation, and utilization of Aristotelian texts and ideas from the Romans through the middle of the thirteenth century. Topics to be examined will include Aristotelian elements in Roman and early Christian "handbooks" (for example, Macrobius, Martianus Capella, Cassiodorus, Isidore of Seville) and in various Church Fathers, Boethius as a key figure in the medieval Aristotelian tradition, the importance of Aristotle for the early medieval history of the trivium and especially of dialectic and its increasing involvement in theology, the early medieval appreciation of the Aristotelian doctrine of the elements (as combined with that deriving from Plato), the translation of Aristotle's works in the twelfth and thirteenth centuries and the reception these works received, the transmission of Aristotelian ideas outside his works (for example, in medical and astrological writings). Readings in translation.

**418 The Aristotelian Tradition in the Later Middle Ages** Spring. 4 credits.

W 3:35-5:20. J. Murdoch.

A study of the interpretation and criticism of Aristotle and of the development and transformation of Aristotelian ideas in the thirteenth and fourteenth centuries. The importance and effect of the condemnation of Aristotelian contentions and their conflict with theological conceptions and doctrines will be considered in general, but the focus of the seminar will consist in an investigation of its theme of "interpretation, criticism, and development" as exemplified in the study of the treatment of specific topics and texts in Aristotle, received throughout a series of medieval authors and works. Readings in translation.

**419 Greco-Romans and Gallo-Celts** Fall. 4 credits.

R 3:35-5:20. C. Brousseau.

The seminar will consider how the renaissance of Greco-Roman antiquity contributed to the formation of a nationalist mythology. Attention will be paid to the collapse of Latin as a universal vehicle of expression and to the abandonment of universal principles of explanation, to the vernacular "particularism" following this collapse, and to the effect of these phenomena on the rise of nationalist literature. This phenomenon will be examined in sources dealing with history (J. Bodin), with literature (E. Pasquier), with the problems of transmission and translation (H. Etienne), and with the very conception of language (Scaliger, Ramus). Readings in French and English.

**420 Grammar in the Middle Ages** Spring. 4 credits.

R 3:35-5:20. C. Brousseau.

An examination of the interaction of grammar with dialectic, rhetoric, and philosophy through a survey of different trends in grammar, from Priscian's normative description of language, derived from literary examples, to the elaboration of the speculative, universalist grammar of the thirteenth and fourteenth centuries. Texts to be studied in translation but a knowledge of Latin will be welcome.

**421-422 The Rhetoric of Renaissance Humanism** 421, fall; 422, spring. 4 credits each term.  
Prerequisite for fall: reading knowledge of Latin or Italian.

M 1:25-3:10. V. Kahn.

The aims of this course are threefold: to familiarize the student with the major texts of Renaissance humanism; to come to a clearer understanding of the institution of literature in the Renaissance (the rules that govern it, the historical factors that influence it); and to raise certain theoretical questions about the historical nature of the act of interpretation. Particular attention will be paid to the humanists' conception of the activity of reading and of the relationship of rhetoric to poetry. Primary texts will include works by Petrarch, Salutati, Valla, Pico, Machiavelli, Montaigne, Spenser, Jonson, Bacon, Hobbes. The fall semester will focus primarily on the Italian Renaissance, the spring semester on the English Renaissance. Students may register for either semester or both.

**423 Thinking One's Way Back into the Past** Fall. 4 credits.

T 1:25-3:10. F. Ahl.

This seminar examines common preconceptions about ancient Greece and Rome and how they shape our thinking about our past. We will begin with seemingly innocuous popular notions, such as "the cradle of civilization," which allow us to turn our history into our own infancy, our ancestors into our children, and then proceed to more complex problems, such as the attempts of modern critics to explain "mythic" time in Greek and Roman poetry in terms of Newtonian time. We will, in short, try to discover what preconceptions we should leave behind as we begin our journey back in time. Texts to be discussed will include passages from Virgil, *The Aeneid*; Seneca, *Trojan Women*; Varro, *The Latin Language*; Lucian, *Select Satires*; Plutarch, *The Face in the Circle of the Moon*; Sallustius, *On the Gods and the Universe*.

**424 Narcissus at the Well** Spring. 4 credits.

T 1:25-3:10. F. Ahl.

Greek and Roman antiquity has long been both the well and the reflecting pool of subsequent Western art and literature. Successive generations discerned in it, with approval or disapproval, the reflection of their own world, ideas, and art. In recent decades the pool has shrunk. This seminar explores various Greek and Roman works that were once part of the reflecting pool, including Homer's *Odyssey*, Ovid's *Metamorphoses*, and Statius's *Thebaid*, and how they were perceived by those who looked in on them at various times. Topics to be included will be: how Homer was interpreted by poets and critics in the first century A.D.; how Statius was read by his medieval Irish translator and by Dante; why Statius is no longer in the reflecting pool, and why Homer and Ovid are. This seminar is intended for undergraduates but should treat enough unfamiliar material to be of interest to graduate students and faculty too. An additional section would be held, on demand, to discuss features of the Greek and Roman writers that can be seen even after a cursory glance at the original.

**425-426 The Carolingian Renaissance** 425, fall; 426, spring. 4 credits each term.

W 1:25-3:10. J. J. John.

The seminar will treat selected aspects of Western European history in the eighth and ninth centuries, the period responsible for the preservation of so much of the Latin classical tradition. Attention will be devoted not only to self-conscious revivals of classical ways but also to unconscious or conscious continuities and modifications of those ways. An attempt will be made both to determine what it was within eighth- and ninth-century society, especially within its monastic milieu, that made classical ways appealing and to define the effects that the interaction of the classical and monastic traditions had on each other. Subjects to be studied will include the book-making arts (with particular emphasis on scripts and decoration) and libraries in the fall

semester and educational methods, historiography, and literature in the spring semester. Students may enroll in either semester or in both

**427-428 The Rhetoric of Justice** 427, fall; 428, spring. 4 credits each term.

R 1:25-3:10. J. Koffler.

This course explores classical formulations of the nature of law and justice and critically examines their reformulation in medieval and Renaissance cultures. We will give special attention to the problems of tyranny and violence, to the theories that condemn or vindicate them, to the related issue of natural law, and to the relations between law and language, rhetoric and justice. Readings will be drawn from a variety of texts, including Dante and Shakespeare. The first semester will emphasize classical antiquity and the medieval era; the second semester will focus on the Renaissance and the discovery of the New World and will conclude with Vico. Students may register for either semester or both.

**433-434 Guided Reading** 433, fall; 434, spring. 2 credits each term.

Staff.

**435-436 Guided Research** 435, fall; 436, spring. 4 credits each term.

Staff.

## South Asia Program

B. Macdougall, director; R. D. Colle, A. T. Dotson, E. C. Erickson, J. W. Gair, M. D. Glock, C. Holmberg, M. Katzenstein, F. Kayastha, K. A. R. Kennedy, G. B. Kelley, R. D. MacDougall, K. March, G. W. Messing, S. J. O'Connor, T. T. Poleman, N. Uphoff

The South Asia Program exists to encourage and correlate teaching and research in South Asian studies dealing with Bangladesh, India, Nepal, Pakistan, and Sri Lanka (Ceylon). The program faculty includes members from a number of disciplines. Undergraduates with a special interest in South Asia may major in Asian studies with a concentration in South Asia. Languages regularly offered are Hindi, Sinhalese, Tamil, Telugu, and Urdu. Cornell is a charter member of the American Institute of Indian Studies (AIIS), and undergraduates as well as graduate students are eligible for AIIS three-month summer or nine-month intensive language programs in India. For courses available in South Asia and details on the major, see the Department of Asian Studies listing in this volume. Students wishing further information should see the director, South Asia Program, 130 Uris Hall.

## Southeast Asia Program

S. J. O'Connor, director; B. R. Anderson, R. Barker, M. L. Barnett, J. A. Boon, E. W. Coward, M. Hatch, C. Hirschman, F. E. Huffman, R. B. Jones, Jr., G. McT. Kahin, A. T. Kirsch, J. T. Siegel, J. U. Wolff, O. W. Wolters, D. K. Wyatt

Southeast Asia studies at Cornell is included within the framework of the Department of Asian Studies. Sixteen full-time 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, and rural sociology. Instruction is also offered in a wide variety of Southeast Asian languages: Burmese, Cebuano (Bisayan), Indonesian, Javanese, Khmer (Cambodian), Tagalog, Thai, and Vietnamese. Intensive instruction is offered in the Full-year Asian Language Concentration (FALCON) in Indonesian at the beginning and intermediate levels. The formal program of study is enriched by a diverse range of extracurricular activities, including an informal weekly luncheon seminar, the concerts of the Gamelan Ensemble, and public lectures. 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.

### Women's Studies Program

S. Bem, director; D. Barr, F. Berger, J. Blackall, R. Boyd, K. Brazell, L. Brown, J. Brumberg, S. Buck-Morss, J. Condry, W. Cross, R. Cypess, I. Ezerghalis, J. Farley, L. Fitzgerald, J. Fortune, N. Furman, D. Holmberg, V. Huber, I. Hull, B. J. Isbell, M. Jacobus, M. Katzenstein, B. Koslowski, I. Kramnick, S. McConnell-Ginet, K. March, B. Martin, D. Meyers, M. B. Norton, E. Regan, N. Salvatore, S. Siegel, L. Waugh

Staff and community members: L. Abel, E. Delaran, Z. Eisentein, H. Johnson, L. Kauffman, L. Lavine, J. T. McHugh, N. Meltzer, M. Rivchin, R. Siegel, C. York, I. Zahava

Student members: K. Allen, L. Berlant, V. Cole, L. Joichin, R. Linton, E. Polakoff, J. Schecter, E. Seyler, H. Silverberg, G. Weix, C. Widmer

Women's Studies, a University program in the College of Arts and Sciences, has three goals: to encourage the development of teaching about women and sex roles for women and men; to examine assumptions about women in various disciplines and to develop, systematize, and integrate back into the disciplines new knowledge about women; and to cooperate in public service activities with the extension divisions of the University.

The program is guided by a board composed of faculty and students at Cornell and members of the Cornell and Ithaca communities who have an intellectual interest in women's studies. Program facilities in Uris Hall, including reading room, informal lounge, and seminar room, are open to all interested students and faculty.

### Program Offerings

Undergraduate students in the College of Arts and Sciences wishing to major in women's studies can design their own major through the College Scholar or Independent Major Programs. Any graduate student in the University may elect a women's studies minor. Students interested in either major or minor should obtain further information from the Women's Studies office, 332 Uris Hall.

The program typically sponsors a biweekly noncredit seminar for students and faculty to facilitate sharing of knowledge across disciplinary lines. During the academic year the program also sponsors frequent public lectures dealing with social, political, and intellectual issues in women's studies.

### The Concentration

Undergraduate students who wish to graduate with a concentration in women's studies should consult with the director of undergraduate studies in women's studies to select an adviser. In collaboration with that adviser, students will design a coherent program in women's studies to complement their major. Before graduation students will submit to their adviser a final summary on their completed work in women's studies. The concentration is open to students in all colleges of the University.

The concentration in women's studies consists of four courses. Typically, two courses are selected from the list of general courses and two from the list of specialized courses (see below). Freshman Seminars, related courses, or independent study in

women's studies may be substituted for specialized courses in the concentration with the prior approval of the adviser.

For further information or to meet with the director of undergraduate studies to select an adviser, students should contact the Women's Studies Office, 332 Uris Hall, 256-6480.

### Distribution Requirement

Distribution requirements are satisfied by any two Women's Studies courses in any of the following categories.

*Social Sciences*: any two of 238, 244, 277, 321, 353, 422, plus courses that have been taken previously, with the department's approval.

*History*: any two of 227, 238, 326, 363, 426, plus courses that have been taken previously, with the department's approval.

*Humanities*: any two of 248, 249, 251, 348, 399, 451, 453, 456, 467, 478, 479, 493, plus courses that have been taken previously, with the department's approval.

*Expressive arts*: any two of 248, 249, 348, 399, 451, 453, 456, 476, 478, 479, 483, 493, plus past courses, with the department's approval.

### Courses

Keeping in mind that women's studies is interdisciplinary, it is useful to distinguish six core areas or foci within the program: ideology and culture, institutions and society, history, literature and the arts, psychology and human development, and natural sciences.

The program offers undergraduate and graduate courses in all of the core areas, both independently and in cooperation with other departments. Women's studies courses are grouped into four categories to assist students in selecting the level or degree of specialization suited to their program:

- I) Freshman Seminars.
- II) General courses (which provide a general introduction to a broad subject area or core focus within women's studies).
- III) Specialized courses and seminars (which have smaller enrollments and focus upon more specialized topics within each of the core areas).
- IV) Related courses and seminars (which need not focus exclusively upon women's studies issues, but include significant consideration of sex differences, feminist criticism, or gender).

### I. Freshman Seminars

#### [104 Women and Social Transitions in the Twentieth Century (also Asian Studies 101)]

Spring. 3 credits. Not offered 1983-84.

B. deBary.]

#### [105 Feminine and Masculine Ideals in Japanese Culture (also Asian Studies 105)]

Fall. 3 credits.

MWF 12:20. K. Brazell.

In its long history, Japanese culture has developed a large number of role models—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 culture.

#### [106 Women and Writing (also English 105)]

Fall and spring. 3 credits.

Hours to be arranged. Fall: M. Hite; spring:

M. Jacobus.

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 relation 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 Seminar Program office and the Women's Studies Program 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.

#### [107 The Family in American History (also History 107)]

Spring. 3 credits. Not offered 1983-84.

M. B. Norton.]

### II. General Courses

#### [110 Introduction to Women's Studies]

Fall.

3 credits.

MWF 11:15-12:05. C. A. Martin.

Women's economic, social, and cultural movement over the past fifteen years has challenged our society's socioeconomic hierarchies and the knowledge(s) that sustain them. In the process, traditional cultural representations of "woman" and material constraints on women have been opened up to critical examination and change. This course introduces students to the critical analyses of Western culture developed in the context of the feminist movement. We will begin by establishing a conceptual framework for interpreting cultural texts and social practices for patterns of sexual difference and power. We will focus on those socioeconomic, sexual, and racial dynamics of our own culture that structure the ideological and material constraints on women of different classes, races, ages, ethnic backgrounds, and sexual preferences. Our studies will include different forms of social organization and control from language, identity formation, and body image to rape, violence against women, and poverty. We will conclude with an introduction to the history of the women's movement(s) in this country and Europe.

#### [214 Biological Basis of Sex Differences (also Biological Sciences 214 and Biology and Society 214)]

Spring. 3 credits. Prerequisite: one year of introductory biology.

Lecs. T R 8:35-9:55, and occasional 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, and, 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.

#### [227 Modern American Sex Roles in Historical Perspective (also History 227)]

Fall. 4 credits.

Intended primarily for sophomores; limited to 20

students. Not offered 1983-84.

M. B. Norton.]

#### [244 Language and the Sexes (also Linguistics 244)]

Spring. 4 credits. Prerequisites: Linguistics 101 or 111, or Psychology 215, or permission of instructor.

Not offered 1983-84.

S. McConnell-Ginet.]

#### [249 Feminist Issues in Nineteenth- and Twentieth-Century Literature (also English 248)]

Spring. 4 credits. Not offered 1983-84.

M. Jacobus.]



**[277 Psychology of Sex Roles (also Psychology 277 and Sociology 277)]** Spring 3 or 4 credits.  
Prerequisite: an introductory psychology course. Not offered 1983-84.  
S. Bem.]

**321 Sex and Gender in Cross-Cultural Perspective (also Anthropology 321)** Fall 4 credits.

M W F 2:30. K. S. March.  
An introduction to the study of sex roles cross-culturally and to anthropological theories of sex and gender. The course examines various aspects of the place of the sexes in social, political, economic, ideological, and biological systems to emphasize the diversity in gender and sex-role definition around the world.

**326 Women in the American Society, Past and Present (also History 326)** Fall 4 credits.  
T R 9:05. 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, and contemporary feminism.

**353 The Feminist Movement and Public Policy (also Government 353)** Fall 4 credits.

T R 10:10-11:25. M. Katzenstein.  
The course examines 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, 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.

### III. Specialized Courses and Seminars

**238 The Historical Development of Women as Professionals, 1800-1980 (also Sociology 238 and Human Development and Family Studies 258)** Fall 3 credits. Students in endowed units must register for Women's Studies or Sociology 238.

T R 2:30-4. J. Brumberg.  
The historical evolution of the female professions in America (midwifery, nursing, teaching, librarianship, prostitution, home economics, and social work) as well as women's struggles to gain access to medicine, law, the clergy, the academy. 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 structure, and American society are also discussed.

**248 Major Nineteenth-Century Women Novelists (also English 247)** Fall 4 credits.

M W F 1:25. J. Blackall.  
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 for 1983 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"; Chopin, *The Awakening*. In addition, the 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.

**251 Twentieth-Century Women Novelists (also English 251)** Spring 4 credits.

M W F 1:25. M. Hite.  
In this course we will be especially concerned with self-consciously experimental novels and with the questions such novels raise about vision or style. Novels we will be reading include Virginia Woolf's *The Waves*, Gertrude Stein's *Three Lives*, Djuna Barnes's *Nightwood*, Doris Lessing's *The Golden Notebook*, and Margaret Atwood's *Surfacing*.

**348 The Female Literary Tradition: Wollstonecraft to Woolf (also English 348)** Spring 4 credits

M W F 12:20. M. Jacobus.  
A survey of the (mainly British) "female literary tradition" from the French Revolution to early twentieth-century Modernism. The course will trace the dual legacies of Romanticism and revolution through their monstrous and gothic forms, exploring their repressed presence in Victorian women's fiction until they surface again in the writing of the 1848 revolution and after. As well as the social protest literature of the mid-nineteenth century, we will look at the literature of the (female) uncanny, through which Victorian women writers confront their inner worlds, before turning to the emergence of the "new woman" and Utopian women's fiction at the end of the nineteenth century and to the beginnings of the twentieth-century modernist experiment by women. Texts will include works by Wollstonecraft, Austen, Mary Shelley, Emily and Charlotte Bronte, Eliot, Barrett Browning, Gaskell, Gilman, Schreiner, and Woolf.

**355 Feminist Theory and the Challenge of Third World Feminisms** Spring 4 credits

Hours to be arranged. C. Mohanty.  
This course is designed to explore the major issues in feminist theory vis-à-vis the recent challenges posed by women of color in the United States (black, Latina, Asian-American, Native American), and women from Third World countries. We shall focus on five issues: the concepts of patriarchy, sexuality, language and representation, labor (paid and unpaid), and reproduction. Each issue will be analyzed through representative readings and through contextual analysis of the political questions foregrounded by a study of that issue (for example, the birth control movement under the issue of reproduction, and the wages-for-housework debate under the issue of labor). A close analysis of the specific political questions will enable us to understand the challenges posed by Third World women within the framework of particular socio-historical contexts. The overall goal of this course is a critical knowledge of the major issues in feminist theory, as well as the development of an understanding of and sensitivity to the problems that arise when feminist theory speaks for all women.

**[363 Women in Classical Greece and Rome (also Classics 363)]** Spring 4 credits. Not offered 1983-84.  
L. Abel.]

**365 Directions In Feminist Theory (also Government 362)** Spring 4 credits.

Hours to be arranged. C. A. Martin.  
This course is designed to explore developments in contemporary feminist theory with particular attention to feminist critiques, reinterpretations, and uses of Marxist, psychoanalytic, and (post)structuralist thought. We will be concerned throughout the course both with the ways in which radical feminist questions converge with developments in these fields and the ways in which feminist analyses challenge some of the most basic assumptions embedded in these and other social theories. We will consider the approaches of a variety of feminist thinkers to the relations between "patriarchy" and the political, economic, and racial hierarchies that structure various social systems and ideologies. Texts such as Michele Barrett's *Women's Oppression Today*, which takes account of developments in the three areas explored earlier in the course, and Michel Foucault's *History of Sexuality*, which introduces new

conceptions of the relations between sexuality, knowledge, and power, will provide the focus for in-depth discussions.

**[399 The Divided Self in Women's Writing (also Comparative Literature 399)]** Spring 4 credits. Not offered 1983-84.  
I. Ezergailis.]

**422 Special Problems in the Anthropology of Sex and Gender (also Anthropology 422 and Biology and Society 406)** Fall 4 credits. Prerequisite: Women's Studies/Anthropology 321 or permission of instructor.

R 2:30-4:25. K. S. March.  
Each year this seminar focuses on a particular area in the anthropology of sex and gender, building on work done in Anthropology/Women's Studies 321. The topic for fall 1983 will be women in international development. The seminar will look at the integration of women into development planning and projects: the confrontation between the feminisms of developing and developed countries, political rights and participation, land reform, credit, agricultural extension services, technological change, small and landless farmers, migration, informal marketing, domestic service, cottage industry, multinational industry, legal reform, education, family planning, fertility, and infant formulas. Overall, the seminar pivots around the question of how much Western sexual and family norms, as well as preconceptions about the place of men and women in the public sector, lie at the heart of Western models for development intervention.

**453 Victorians and Modernists: Literary Legends from Wilde to Woolf (also English 453)** Spring 4 credits.

M 2:30-4:30, plus one hour to be arranged.  
S. Siegel.  
What influence do art and life exert on each other? Should art be judged according to moral categories? Should some art be censored? In what ways are art and politics related? What role does gender play in our view of art? What role does art play in our view of gender? These questions, which divided the Victorians, were addressed at the trials of Oscar Wilde. The first half of the semester the seminar will read the transcripts of those trials, reports of the event in the periodical press, and the writings of Wilde and his contemporaries. The second half of the semester the seminar will read W. B. Yeats, James Joyce, G. B. Shaw, Ezra Pound, T. S. Eliot, Wyndham Lewis, and Virginia Woolf on issues of art, politics, and gender that were raised, but not resolved, by the later Victorians.

**456 Edith Wharton, Willa Cather, and Eudora Welty (also English 456)** Spring 4 credits.

T R 2:30-3:45. 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 achievements as regionalist writers, and for their practice of the craft of fiction. Reading in 1984: 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, *A Curtain of Green*, *The Wide Net*, *The Golden Apples*, and *The Robber Bridegroom*. Discussion format with three essays.

**468 The Theory and Politics of Liberal Feminism (also Government 468)** Spring 4 credits.

W 1:30-3:30. D. Meyers, M. Katzenstein.  
A study of the assumptions and arguments of liberal feminism. The course will have three foci. It will examine the doctrines of liberal feminism, consider how these doctrines translate into political issues and programs, and appraise the merits of the critiques from the left and right.

**476 Women's Poetry (also English 476)** Fall. 4 credits. Limited to 25 students. Prerequisite: permission of instructor.  
T R 10:10. 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.

**[478 Women and Writing (also English 478)]** Fall. 4 credits. Not offered 1983-84.  
M. Jacobus.]

**[479 On Reading Women Poets (also English 479)]** Spring. 4 credits. Not offered 1983-84.  
S. Siegel.]

**493 French Feminisms (also French 493)** Spring. 4 credits.  
M W F 10:10. N. Furman.

This course will examine the political, theoretical and literary concerns of contemporary French feminist writers. Readings will include representative texts by Simone de Beauvoir, Marguerite Duras, Luce Irigaray, Monique Wittig and Helene Cixous. Taught in English.

**499 Directed Study** Fall or spring. Variable credit. Prerequisite: one course in women's studies and permission of a faculty member of the Women's Studies Executive Board.  
Hours to be arranged. Staff.

**626 Graduate Seminar in the History of American Women** Fall. 4 credits. Limited to graduate students, except for seniors with extensive women's studies/ history backgrounds.  
T 2:30-4:30. M. B. Norton.

The course will survey the major works in the field of American women's history and examine them critically. Each student will conduct her or his own research in the field and write a long (25-35 pages) paper.

**[627 Graduate Seminar in the History of American Women]** Spring. 4 credits. Not offered 1983-84.  
M. B. Norton.]

**638 Contemporary German Women Writers (also German Literature 638)** Fall. 4 credits.  
R 3:35-5:35. I. Ezergailis.

A close examination of selected writings, prose and poetry, by some prominent female authors in East and West Germany after World War II. Though the emphasis will be on reading the texts, the conditions for their creation and some antecedents will be surveyed. Among the authors to be considered are Christa Wolf, Ingeborg Bachmann, Gabriele Wohmann, Irmtraud Morgner, Karin Struck, and Verena Stefan.

**[685 Seminar in Sex Differences and Sex Roles (also Psychology 685 and Sociology 685)]** Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1983-84.  
S. Bem.]

#### IV. Related Courses and Seminars

**[305 Psychological Anthropology (also Anthropology 305)]** Fall. 4 credits. Not offered 1983-84.  
B. J. Isbell.]

**[329 Race, Gender, and Politics (also Government 329)]** Fall. 4 credits. Open to sophomores and juniors. Limited to 5 students. Not offered 1983-84.  
M. Katzenstein.]

**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.

T R 2:30-4. 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.

**379 Freud (also Government 379)** Spring. 4 credits.

Hours to be arranged. S. Buck-Morss.  
Analysis of Freud's own writings on psychological and social theory, clinical practice, and analytic method. Consideration of the political implications of these texts and their philosophical contribution. Critical discussion of post-Freudian revisions of the theory, including Left Freudianism, ego-psychology, and radical feminism.

**[456 Edith Wharton, Willa Cather, and Eudora Welty (also English 456)]** Spring. 4 credits. Not offered 1983-84.  
M. Blackall.]

**[463 The Repressed Feminine in the Writings of Marx (also Government 466)]** Fall. 4 credits. Not offered 1983-84.  
S. Buck-Morss.]

**[467 Current Topics in Political Philosophy (also Government 467)]** Fall. 4 credits. Not offered 1983-84.  
D. Meyers.]

**671 Readings in Contemporary Social Theory (also Government 670)** Spring. 4 credits.

Hours to be arranged. S. Buck-Morss.  
Issues will include neo-Marxism, structuralism, poststructuralism, and feminism.

**[759 Virginia Woolf (also English 759)]** Fall. 5 credits. Prerequisite: permission of instructor. Not offered 1983-84.  
S. Siegel.]

#### Related Courses in Other Departments

**Time as a Human Resource (Consumer Economics and Housing 411)** Fall. 3 credits.  
R. Heck.

**Dress: A Reflection of American Women's Roles (Design and Environmental Analysis 245)** Fall. 3 credits.  
A. Racine.

**The Family in Modern Society (Human Development and Family Studies 150)** Fall. 3 credits.  
P. Moen.

**The Family in Cross-cultural Perspective (Human Development and Family Studies 354)** Spring. 3 credits.  
E. Kain.

**Theories of Adult Interpersonal Relationships (Human Development and Family Studies 358)** Fall. 3 credits.  
H. Feldman.

**Families and Social Policy (Human Development and Family Studies 456)** Spring. 3 or 4 credits  
P. Moen.

**Contemporary Family Theory and Research (Human Development and Family Studies 650)** Fall. 3 credits.  
E. Kain.

**Women at Work (Industrial and Labor Relations 366)** Spring. 4 credits.  
F. Miller.

#### Faculty Roster

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, Asst. Prof., Chemistry  
Adams, Barry B., Ph.D., U. of North Carolina. Prof., English  
Ahl, Frederick M., Ph.D., U. of Texas at Austin. Prof., Classics  
Albrecht, Andreas C., Ph.D., U. of Washington. Prof., Chemistry  
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. Prof., 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  
Ascher, Robert, Ph.D., U. of California at Los Angeles. Prof., Anthropology  
Ashcroft, Neil W., Ph.D., Cambridge U. (England). Prof., Physics/LASSP\*  
Austin, William W., Ph.D., Harvard U. Given Foundation Professor of Musicology, Music  
Babby, Leonard H., Ph.D., Harvard U. Prof., Modern Languages and Linguistics  
Bacharach, Samuel B., Ph.D., U. of Wisconsin. Assoc. Prof., Industrial and Labor Relations/Sociology  
Baird, Barbara, Ph.D., Cornell U. Asst. Prof., Chemistry  
Baugh, Daniel A., Ph.D., Cambridge U. (England). Prof., History  
Becker, Victor, M.F.A., Brandeis U. Asst. Prof., Theatre Arts  
Beckwith, Steven V.W., Ph.D., California Inst. of Technology. Asst. Prof., Astronomy/CRSR†  
Bem, Daryl J., Ph.D., U. of Michigan. Prof., Psychology  
Bem, Sandra L., Ph.D., U. of Michigan. Prof., Psychology/Women's Studies  
Bennett, John G., Ph.D., U. of Michigan. Asst. Prof., Philosophy  
Béreaud, Jacques, Doctorat d'Univ., U. of Lille (France). Prof., Romance Studies  
Berkelman, Karl, Ph.D., Cornell U. Prof., Physics/LNS  
Bernal, Martin G., Ph.D., Cambridge U. (England). Assoc. Prof., Government  
Berstein, Israel, Candidate in Physico-Mathematical Sciences, Roumanian Academy. Prof., Mathematics  
Bethe, Hans, Ph.D., U. of Munich (Germany). John Wendell Anderson Prof. of Physics Emeritus, Physics  
Bilson, Malcolm, D.M.A., U. of Illinois. Prof., Music  
Bishop, Jonathan P., Ph.D., Harvard U. Prof., English  
Blackall, Eric A., Litt.D., Cambridge U. (England). Jacob Gould Schurman Professor of German Literature, German Literature  
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\*Laboratory of Atomic and Solid State Physics.

†Center for Radiophysics and Space Research.

‡National Astronomy and Ionosphere Center.

§Laboratory of Nuclear Studies.

## 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 six major sections: Biochemistry, Molecular and Cell Biology; Genetics and Development; Ecology and Systematics; Neurobiology and Behavior; Physiology; Plant Biology; and two smaller units, 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, counseling, and other important information 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*.

## Faculty

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## 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 or 105–106 or 101–103 plus 102–104. 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 108, 152, 201, 202, 205, 206, 301, 302, or 304, or by certain other non-biological sciences courses specified by the college.

**In the College of Arts and Sciences**, the biological sciences distribution requirement is for a two-semester introductory biology sequence selected from Biological Sciences 109–110 or 105–106 or 101–103 plus 102–104. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) also satisfies the distribution requirement in the biological sciences.

**In the College of Human Ecology**, the natural sciences distribution requirement is for at least 6 credits selected from Biological Sciences 109–110, 101–103, 102–104, 105–106, 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 100, offered during the six-week Cornell Summer Session for 7 credits, also satisfies the distribution requirement.

Biological Sciences 101–102–103–104 should be taken as a unit by students of any college.

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 intending to major in biological sciences must apply for *final* acceptance into the major with the associate director for academic affairs in 118 Stimson Hall. 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 as follows:

- 1) Introductory biology for majors** (one year): Biological Sciences 101–103 plus 102–104, or 105–106. Biological Sciences 100, offered during the six-week Cornell Summer Session for 7 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 103–104. These students receive a total of 8 introductory biology credits (4 AP credits plus 4 course credits). Freshmen who have not taken the CEEB examination may register for a departmentally administered examination in biology that is given during fall orientation week.
- 2) General chemistry** (one year): Chemistry 207–208,\* or 215–216,\* or 103–104.
- 3) College mathematics** (one year, including at least one semester of calculus): Mathematics 111–112,\* or 113–112,\* or 105–106, or 111–105, or 113–105.
- 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,\* or 112–213–214,\* or 101–102.
- 6) Genetics:** Biological Sciences 281.
- 7) Biochemistry:** Biological Sciences 330 or 331.
- 8) A concentration area** selected from the outline below.†
- 9) Breadth in biology**, as described below.†
- 10) Foreign language:** students registered in the College of Agriculture and Life Sciences must satisfy the foreign language requirement of the

\*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.

†As an alternative to requirements 8 and 9 above, students may choose to complete the Program in General Biology, outlined below.

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.

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.

## Concentration Areas and Requirements

As noted in the list of requirements above, students accepted into the biological sciences major must choose a concentration area or the Program in General Biology. The concentration 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 concentration areas are listed below.

- 1) *Animal Physiology and Anatomy*: Bio S 274, The Vertebrates; Bio S 316, Cellular Physiology;\* an introductory animal physiology course sequence (Biological Sciences 311 and 319 or 416 and 418); and at least one additional course selected from the following: Bio S 212, Invertebrate Zoology; Bio S 313, Histology: The Biology of the Tissues; Bio S 315 and 317, Ecological Animal Physiology; Bio S 385, Developmental Biology; Bio S 389, Embryology; Bio S 414, Vertebrate Morphology; Bio S 458, Mammalian Physiology; An Sc 427, Fundamentals of Endocrinology.

\*This course is required of students who matriculate as freshmen in fall 1981 and thereafter or as transfer students in fall 1982 and thereafter.

- 2) *Biochemistry*: Chemistry 300 or 215–216, Quantitative Chemistry, must be taken. One of the following organic chemistry laboratory sequences also must be taken: Chemistry 301–302, or 251–252–302, or 301, or 251–252. In addition, students must take a physical chemistry sequence (Chemistry 389–390 or 287–288) and a biochemistry laboratory course (Biological Sciences 638 or 430 or 630). It is recommended that students take the more rigorous organic chemistry and physics sequences (Chemistry 357–358 or 359–360 and Physics 207–208) and a third semester of calculus.

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*: Courses chosen with the aid of an adviser to meet the goal of exposing each student to plant structure, function, classification, ecology, and evolution. The following list states the minimum requirements. Biological Sciences 241 provides an introduction to plant biology and can be applied toward the concentration. Five courses (including a plant physiology laboratory course) fulfill the concentration requirement, as follows: (a) Bio S 242 and 244 or 341 and 349, Plant Physiology; (b) Bio S 343, Taxonomy of Vascular Plants; (c) either Bio S 345, Plant Anatomy, or Bio S 347, Cytology; and (d) either Bio S 241, Plant

Biology; Bio S 348, Phycology; Bio S 444, Comparative and Developmental Morphology of the Embryophyta; Bio S 448, Plant Evolution and the Fossil Record; Bio S 463 and 465, Plant Ecology; or PI Pa 309, Introductory Mycology. Students are encouraged to take Bio S 499, Undergraduate Research in Biology. Students may elect to complete the required five courses by taking both courses in group (c) rather than taking any in group (d).

- 4) *Cell Biology*: Chemistry 300 or 215–216, Quantitative Chemistry; Bio S 630, Laboratory in Cell Biology (strongly recommended), or Bio S 430, Basic Biochemical Methods; and one of the following two options:

Option 1: Bio S 432, Survey of Cell Biology, and 8 additional credits distributed between Groups A and B and approved by the adviser.

Option 2: The two courses from Group A and 6 additional credits from Group B approved by the adviser.

Group A: Bio S 438, Cell Proliferation and Oncogenic Viruses; Bio S 483, Molecular Aspects of Development.

Group B: Bio S 305, Basic Immunology, Lectures; Bio S 307, Basic Immunology, Laboratory; Bio S 313, Histology: The Biology of the Tissues; Bio S 345, Plant Anatomy; Bio S 347, Cytology; Bio S 485, Microbial Genetics, Lectures; Bio S 486, Immunogenetics; An Sc 419, Animal Cytogenetics; Micro 290, General Microbiology Lectures; Micro 291, General Microbiology Laboratory; Micro 484, Cytology of Prokaryotes Lectures; Micro 485, Cytology of Prokaryotes Laboratory.

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.

Students anticipating graduate work in cell biology should consider taking a physical chemistry sequence (Chemistry 389–390 or 287–288).

- 5) *Ecology, Systematics, and Evolution*: Bio S 360, General Ecology; Bio S 477, Organic Evolution; a plant or animal physiology course; and at least one 400-level course with accompanying laboratory from within the concentration offerings. In addition to the latter course, students in this area must select at least two laboratory courses beyond those required of all biology majors (i.e., introductory biology, genetics, and organic chemistry). These two laboratory courses may include the physiology course or courses counted toward fulfillment of the breadth requirement, or both. It is strongly recommended that students planning graduate study take a course in statistics (Industrial and Labor Relations 210 or 311).
- 6) *Genetics and Development*: Nine credits, usually selected from the following courses: Bio S 282, Human Genetics; Bio S 347, Cytology; Bio S 385, Developmental Biology; Bio S 389, Embryology; Bio S 446, Cytogenetics; Bio S 477, Organic Evolution; Bio S 481, Population Genetics; Bio S 483, Molecular Aspects of Development; Bio S 484, Molecular Evolution; Bio S 485 and 487, Microbial Genetics; Bio S 486, Immunogenetics; Bio S 499, Undergraduate Research in Biology; Bio S 644, Plant Growth and Development; An Sc 419, Animal Cytogenetics; PI Br 605, Physiological Genetics of Crop Plants.
- 7) *Neurobiology and Behavior*: The two-semester introductory course sequence Neurobiology and Behavior I and II (Biological Sciences 221 and 222) with discussion section (4 credits per term) and 9 additional credits, including a second course from the neurobiology and behavior offerings. Biological Sciences 420, 498, 499, and 720 may not be used as the second course. The remainder of the 9 credits may be in any course

(such as physiology, developmental biology, cellular biology, ecology, or vertebrate or invertebrate biology) approved by the adviser as appropriate preparation for work or advanced study in neurobiology and behavior or in related subjects. Courses used to fulfill the concentration requirements may not be counted toward fulfillment of the breadth requirement.

*Note*: The above requirements are for those who declare the concentration in neurobiology and behavior in September 1983 or thereafter. Students who declared the concentration in neurobiology and behavior prior to September 1983 should complete the concentration requirements as stated in the 1982–83 edition of *Courses of Study*.

- 8) *Independent Option*: Special programs for students interested in biophysics, microbiology (College of Arts and Sciences students only), or nutrition are available under this option. In addition, students who want to undertake a course of study not covered by the seven existing concentration areas, special programs, or the Program in General Biology 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, 118 Stimson Hall.

## Requirement for Breadth in Biology

To fulfill the requirement for breadth in biology, students must pass a total of two courses outside of their concentration area, selected from two of the categories listed below. Students may not count two courses for breadth credit if one course is a prerequisite to the other course. Students should consult their faculty advisers when choosing the courses to meet this requirement.

- 1) *Animal Physiology and Anatomy*: Biological Sciences 212, 214, 274, 311, 313, 315, 389, 416.
- 2) *Botany*: Biological Sciences 241, 242 and 244, 341 and 349, 343, 345, 348, 441; Plant Pathology 309.
- 3) *Cellular and Developmental Biology*: Biological Sciences 305, 347, 385, 432, 483; Microbiology 290.
- 4) *Ecology, Systematics, and Evolution*: Biological Sciences 260, 360, 364, 471, 472, 475, 476, 477; Entomology 212.
- 5) *Neurobiology and Behavior*: Biological Sciences 221, 222.

*Note*: Biological Sciences 471, 472, 475, and 476 may not be used as breadth courses if Biological Sciences 274 is counted as a breadth course.

Biological Sciences 385, 432, 471, 472, 475, and 476 may not be used as breadth courses by students concentrating in animal physiology and anatomy.

Biological Sciences 347 may not be used as a breadth course by students concentrating in botany.

Biological Sciences 305, 313, 345, 347, 432, 483, and Microbiology 290 may not be used as breadth courses by students concentrating in cell biology.

Biological Sciences 347, 385, 389, 477, and 483 may not be used as breadth courses by students concentrating in genetics and development.

## Program in General Biology

As an alternative to the requirements for a concentration area and for breadth in biology, students may choose to complete the Program in General Biology. These students must fulfill all other requirements for the biological sciences major. The specific requirements for the program are:

- 1) Ecology (Biological Sciences 260 or 360).
- 2) Neurobiology and Behavior I or II (Biological Sciences 221 or 222).

- 3) A physiology course from the following: Bio S 242 and 244 or 341 and 349, Plant Physiology; Bio S 311, Introductory Animal Physiology, Lectures; Bio S 315, Ecological Animal Physiology, Lectures; Bio S 416, General Animal Physiology: A Quantitative Approach, Lectures.
- 4) One course from the following: Bio S 212, Invertebrate Zoology; Bio S 241, Plant Biology; Bio S 274, The Vertebrates; Bio S 343, Taxonomy of Vascular Plants; Bio S 348, Phycology; Entom 212, Insect Biology; Micro 290 and 291, General Microbiology.
- 5) At least one course concentrating on plants. This may be satisfied by a course that also fulfills requirement 3 or 4.
- 6) At least one course with a laboratory. This may be satisfied by a course that also fulfills requirement 3 or 4 or 5.
- 7) A biological sciences course offered for 2 or more credits having as a prerequisite one of the following: Bio S 221, Neurobiology and Behavior I; Bio S 222, Neurobiology and Behavior II; Bio S 241, Plant Biology; Bio S 242 or 341, Plant Physiology; Bio S 260 or 360, Ecology; Bio S 274, The Vertebrates; Bio S 281, Genetics; Bio S 311, Introductory Animal Physiology, Lectures; Bio S 315, Ecological Animal Physiology, Lectures; Bio S 330 or 331, Principles of Biochemistry; Bio S 416, General Animal Physiology: A Quantitative Approach, Lectures.

## Independent Research and Honors Program

**Individual research projects** under the direction of a faculty member are encouraged as part of the program of study within a concentration. 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. 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, G20 Stimson Hall.

Research credits may *not* be used in completion of the following concentration areas: animal physiology and anatomy; biochemistry; botany; cell biology; and ecology, systematics, and evolution. No more than 4 credits of research may be used in completion of the following concentration areas: genetics and development, and 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 faculty. Applications for the honors program are available in the Office for Academic Affairs, 118 Stimson Hall, and must be submitted to the Honors Program Committee by the first week of classes of the senior year. 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. 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. In rare cases, research done elsewhere may be presented for honors, provided that *prior approval* of the Honors Program Committee has been given. 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. Requirements of the honors program include participation in honors research seminars during two semesters, submission of an acceptable honors thesis, 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. Details pertaining to thesis due dates, seminars, and other requirements may be obtained from the chairperson of the Honors Program Committee or from the Office for Academic Affairs, 118 Stimson Hall. Information on faculty research activities is available in the Behrman Biology Center, G20 Stimson Hall.

## Curriculum Committee

Many decisions pertaining to the curriculum, to division-wide requirements, and to concentration and breadth areas 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 (G20 Stimson Hall), or contact the associate director for academic affairs (118 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.

## Index of Courses

The middle digits of biological sciences course numbers are used to denote courses in specific areas: 0, general; 1, animal physiology and anatomy; 2 and 9, neurobiology and behavior; 3, biochemistry, molecular and cell biology; 4, botany; 6 and 7, ecology, systematics, and evolution; 8, genetics and development. The middle digit 5 is used when all other course numbers in a particular area have already been assigned.

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## General Courses

**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. 29 and Nov. 10; spring, Feb. 23 and Mar. 22. C. D. Hopkins.

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, anatomy, physiology, and behavior. The spring semester covers genetics and development, evolution, ecology, the origin of life, and the diversity of living organisms. Each topic is considered in the light of modern evolutionary theory.

**103–104 Biological Sciences, Laboratory** 103, fall; 104, spring. 2 credits each term. Prerequisite: concurrent enrollment in Biological Sciences 101 (fall) or 102 (spring), or written permission of instructor. 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., T R or S 8–11, or F 10:10–1:10. One 3-hour lab each week and a weekly lec section for discs, special lecs, etc. To accommodate weekly lec section, students must reserve M W and F 9:05 or 10:10, since the day of the lec section varies throughout the semester. J. C. Glase, P. R. Ecklund, R. E. Keyel, and staff.

A laboratory course emphasizing the methods used by biologists to discover new knowledge. Students design and perform investigations in biology. In preparation for this, exposure is given to basic biological concepts, research methodologies, relevant data analysis techniques and statistics, instrumentation, and laboratory techniques in all of the major areas of biology. Research projects include investigative design, data analysis, and communication of investigative results and conclusions.

**105–106 Introductory Biology** 105, fall; 106, spring. 4 credits each term (or 2 credits for transfer students, with permission of instructor). 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. Fee, \$5. Lec, M 12:20; disc, 1 hour each week to be arranged; additional study and lab hours arranged at student's convenience. First lecture of fall term held on first day of classes (Wednesday, August 31). J. Gibson, E. R. Loew, C. H. McFadden.

Designed primarily for biology majors, preprofessionals, and other students who desire a challenging broad introduction to fundamental concepts of biology. The fall semester covers biochemistry and physiology. The spring semester covers genetics, development, ecology, evolution, behavior, and the diversity of organisms. The course uses an autotutorial format and covers material from readings, demonstrations, and laboratories. Completion of the course requires mastery of a group of core units. Testing on these units is primarily by oral examination. The final grade is determined by performance on the core units, the laboratories and additional materials, and the final examination.

**108 Interactive Computing for Students of Biological Sciences** Spring. 1 credit. Not open to students with prior courses in computing.

Lec, T 1:25; lec every other week. Staff. An introduction to computing using the interactive language BASIC, with a discussion of other algebraic computing languages such as FORTRAN. Students are issued tickets for 10 hours of computing time at the Division of Biological Sciences interactive computing facility. Applications to problems in the biological sciences for which microcomputers may be used are emphasized.

**109–110 Biological Principles** 109, fall; 110, spring. 3 credits each term. Limited to 600 students. Prerequisite: 109 is prerequisite to 110 unless written permission is obtained from instructor and the student has at least 3 credits of college biology. S-U grades optional (not recommended). May not be taken for credit after Biological Sciences 101–104 or 105–106. This course 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. 29 and Nov. 10; spring, Feb. 23 and Mar. 22. Fall: P. R. Ecklund, C. Eberhard; spring: A. W. Blackler, C. Eberhard.

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.

**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 110, or permission of instructor. S-U grades only. *This course may not be used in fulfillment of college distribution requirements.*

Lec, 1 hour each week to be arranged. E. R. Turgeon, C. Eberhard.

A lecture course designed to complement Biological Sciences 109–110 by providing an opportunity for deeper exploration of selected topics of particular interest. Students are asked for suggestions on lecture subjects. Class involvement and discussion are encouraged. The final grade is determined on the basis of three examinations to be taken during lecture hours.

**201–202 History of Biology (also Biology and Society 287–288 and History 287–288)** 201, fall; 202, spring. 3 credits each term. Prerequisite: one year of introductory biology. 201 is not prerequisite to 202. S-U grades optional.

Lecs, T R 10:10–11:30. 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. The fall semester covers the period from classical antiquity to 1900. The spring semester is devoted entirely to twentieth-century biology.

**205 Biomedical Ethics (also Philosophy 245)** Fall. 3 credits. Primarily for sophomores, juniors, and seniors; permission of instructor required for graduate students.

Lecs, M W F 1:25. C. Hughes. Critical analysis of the conceptual framework in which ethical problems in biology and medicine are to be understood, debated, and solved. Problems include contraception, abortion, and infanticide; euthanasia and suicide; physician-patient relationships and medical paternalism; and the allocation of scarce medical resources (both micro and macro).

**206 Environmental Ethics (also Philosophy 246)** Spring. 3 credits. Open to sophomores, juniors, and seniors; permission of instructor required for graduate students.

Lecs, M W F 1:25. C. Hughes. Critical analysis of the conceptual framework in which environmental policies are formulated and judged. Problems include private interest versus the public good; the relation of individual rights to the collective welfare with respect to property, compensation, and the exercise of eminent domain; and moral obligations to the poor, to future generations, and to the nonhuman environment.

**301 Biology and Society I: The Biocultural Perspective (also Anthropology 301 and Biology and Society 301)** Fall. 3 or 4 credits (4 credits by arrangement with instructor). Prerequisite: one year of introductory biology. S-U grades optional. This is part of the two-semester core course for the biology and society major and is also available to other students who have fulfilled the necessary prerequisite.

Lecs, T R 8:40–9:55. D. J. Greenwood. Human biology, behavior, and institutions are viewed as the ongoing products of the interactions between human biological evolution and cultural change. These interactions are documented with reference to the evolution of the capacity for culture; human groups and institutions; language, meaning, and cultural "realities"; and major models of human nature and human institutions.

**302 Alternative Food-Production Systems (also Anthropology 302 and Biology and Society 302)** Spring. 3 or 4 credits (4 credits by arrangement with instructor). Prerequisite: Biological Sciences 301 or permission of instructor. S-U grades optional. This course fulfills the second-semester core-course requirement for the biology and society major and is also available to other students who have taken 301.

Lecs, T R 10:10–11:30. Staff. Substantiation is presented for the claim that significant changes in our food-production system are needed. The inadequacies in our current system are examined from a multidisciplinary perspective, with consideration of the relevant scientific, social, public-policy, and ethical issues. Current controversies on such issues as energy use in agriculture, crop-breeding programs, soil conservation, chemicals in agriculture, and international food policy are considered. Emphasis is placed on developing alternatives to current practices. Lectures covering assigned readings are followed by discussion sessions.



**[304 Chemicals, Enzymes, and Maladies (also Biology and Society 304 and Toxicology 304)]**

Spring. 3 or 4 credits (4 credits by arrangement with instructor). Prerequisites: Biological Sciences 301 and previous or concurrent enrollment in 330 or 331, or permission of instructor. S-U grades optional. This course fulfills the second-semester core-course requirement for the biology and society major and is also available to other students who meet the prerequisites. Not offered 1983–84.

Lecs, T R 10:10–11:30. J. M. Fessenden-Raden. The biochemical effects of toxic chemicals as potential health hazards are examined from a multidisciplinary perspective. Scientific, social, public-policy, and ethical issues are analyzed critically. Topics include the biochemical examination of occupational and environmental hazards posed by specific chemicals acting as carcinogens, allergens, mutagens, or teratogens, and chemical diseases. Lectures covering assigned readings are followed by discussion sessions.]

**305 Basic Immunology, Lectures (also Veterinary Medicine 315)** Fall. 2 credits. Recommended: basic courses in microbiology, biochemistry, and genetics.

Lecs, T R 9:05. Evening prelims to be arranged. A. J. Winter.

Course material covers current concepts in immunology at an elementary level, with special emphasis on the biological functions of the immune response.

**307 Basic Immunology, Laboratory (also Veterinary Medicine 316)** Fall. 2 credits.

Prerequisite: a course in basic microbiology or permission of instructor. Recommended: concurrent enrollment in Biological Sciences 305.

Labs, T R 10:10–1:10. N. L. Norcross.

Designed to illustrate immunological concepts presented in Biological Sciences 305. Laboratory exercises are selected to familiarize students with basic humoral and cellular immune phenomena and to offer firsthand experience in immunological laboratory techniques.

**400 Undergraduate Seminar in Biology** Fall or spring. Variable credit. May be repeated for credit. S-U grades optional.

Sem to be arranged. Staff.

From time to time different seminars on topics of interest to undergraduates are offered. Topics and instructors are listed in the division's catalog supplement issued at the beginning of the semester.

**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 100 arts college 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, 274, 324, 330, 430, 464, 468, and 475.

**499 Undergraduate Research in Biology** Fall or spring. Variable credit. *Students in the College of Arts and Sciences may not register for more than 8 credits per term.*

Prerequisite: written permission of staff member who supervises the work and assigns the grade. 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.) 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 take full responsibility for the quality of the work. *This course is divided into multiple sections as printed in the course rosters.* Students must register under supervisor's assigned section number, or under section 01 if supervisor was not assigned a section number. Students registering under section 01 should notify the Office for Academic Affairs in Stimson 118.

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 concentration areas: animal physiology and anatomy; biochemistry; botany; cell biology; and ecology, systematics, and evolution.

No more than 4 credits of research may be used in completion of the following concentration areas: genetics and development, and neurobiology and behavior.

**600 Introduction to Scanning Electron****Microscopy** Fall or spring, weeks 1–4. 1 credit.

Primarily for graduate students but open to seniors who can demonstrate a need for the course. Limited to 10 students. Prerequisite: permission of instructor. S-U grades only.

Lec and lab to be arranged. M. V. Parthasarathy, M. K. Campenot.

A general introduction to the principles and the proper use of the scanning electron microscope. Emphasis is on using the instrument to observe biological specimens and on methods of preparing biological material for scanning electron microscopy.

**602 Advanced Electron Microscopy for****Biologists I** Spring, weeks 1–3. 1 credit. Primarily for graduate students. Limited to 8 students.

Prerequisites: Biological Sciences 603 or equivalent, and permission of instructor. S-U grades only.

Lec, T 11:15; disc to be arranged; labs, T R 1:25–4:25. M. V. Parthasarathy.

High-resolution electron microscopy; problems of obtaining high-resolution electron micrographs of biological specimens; visualization of macromolecules.

**603 Electron Microscopy for Biologists** Fall.

3 credits. Primarily for graduate students but open to upperclass students. Limited to 12 students, with preference given to students with research projects requiring electron microscopy. Prerequisites: either Biological Sciences 313, 345, or 347, or equivalent, and written permission of instructor. Registration during course enrollment recommended. S-U grades optional.

Lec, T 11:15; labs, M W 1:25–4:25, T R 1:25–4:25, or W F 8–11. M. V. Parthasarathy.

Principles of electron microscopy; histological techniques for electron microscopy, such as ultrathin sectioning, negative staining, and metal shadowing; and interpretation of results. A brief introduction to scanning electron microscopy is also included.

**604 Advanced Electron Microscopy for****Biologists II** Spring, weeks 4–6. 1 credit. Primarily for graduate students. Limited to 8 students.

Prerequisites: Biological Sciences 603 or equivalent, and permission of instructor. S-U grades only.

Lec, T 11:15; disc to be arranged; labs, T R 1:25–4:25. M. V. Parthasarathy.

Principles of autoradiography at both light microscopy and electron microscopy levels; incorporation of radioactive material into biological specimens for autoradiography; problems of resolution and quantitative aspects of autoradiography.

**606 Advanced Electron Microscopy for****Biologists III** Spring, weeks 7–9. 1 credit. Primarily for graduate students. Limited to 8 students.

Prerequisites: Biological Sciences 603 or equivalent, and permission of instructor. S-U grades only.

Lec, T 11:15; disc to be arranged; labs, T R 1:25–4:25. M. V. Parthasarathy.

Principles of freeze fracturing and freeze substitution techniques, freezing artifacts and interpretation of images.

**608 Advanced Electron Microscopy for****Biologists IV** Spring, weeks 10–14. 1 credit.

Primarily for graduate students. Limited to 6 students. Prerequisites: Biological Sciences 603 or equivalent, and either Biological Sciences 602, 604, or 606. S-U grades only.

Hours to be arranged. M. V. Parthasarathy. Project in biological ultrastructure.

**[702 X-Ray Elemental Analysis in Biology]**

Spring. 1 credit. Limited to 8 students. Prerequisites: Biological Sciences 600 or 603, and permission of instructor. S-U grades only. Offered alternate years. Not offered 1983–84.

Lec and lab to be arranged. M. V. Parthasarathy, M. K. Campenot.

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. A brief introduction to quantitative elemental analysis is also given.]

**Related Courses in Other Departments****Biology and Society Senior Seminars (Biology and Society 400–402 and 406)****Issues in Biology and Society: Professional Ethics (Biology and Society 311)****Animal Physiology and Anatomy****[212 Invertebrate Zoology]** Spring. 3 credits.

Limited to 20 students. Prerequisite: one year of introductory biology for majors. Not offered 1983–84.

Lecs, T R 11:15; lab, T 2–4:25. Staff.

An introduction to the structure, function, and development of invertebrate animals of the major phyla, with emphasis on the phylogenetic relationships.]

**214 Biological Basis of Sex Differences (also Women's Studies 214)** Spring. 3 credits.

Prerequisite: one year of introductory biology. S-U grades optional.

Lecs, T R 8:35–9:55; occasional 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.

**274 The Vertebrates** Spring. 5 credits. Primarily for sophomores; this course is a prerequisite or recommended course for many advanced courses in vertebrate biology, anatomy, and physiology. Each lab limited to 21 students. Prerequisite: one year of introductory biology for majors. Fee, \$10.

Lecs, T R 10:10; labs, M W 1:25–5, M W 7–10 p.m., or T R 1:25–5. Evening prelim to be arranged. Staff.

An introduction to the evolution, classification, comparative anatomy, life history, and behavior of vertebrate animals. Laboratory dissection and demonstration are concerned with structure, classification, systematics, biology of species, and studies of selected aspects of vertebrate life.

**311 Introductory Animal Physiology, Lectures (also Veterinary Medicine 346)** Fall. 3 credits  
Prerequisites: one year of college biology, chemistry, and mathematics. May not be taken for credit after Biological Sciences 416.

Lecs, M W F 11:15. Evening prelims to be arranged. K. A. Houpt and staff.  
A general course in vertebrate physiology emphasizing the basic characteristics of the circulatory, nervous, pulmonary, renal, and gastrointestinal systems; endocrinology; and reproductive physiology. Neural and hormonal control of function is emphasized.

**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 11:15; labs, T R 2-4:25. W. A. Wimsatt. Provides the student with a basis for understanding the microscopic, fine-structural, and functional organization of vertebrates, as well as the methods of analytic morphology at the cell and tissue levels. The dynamic interrelations of structure, composition, and function in cells and tissues are stressed.

**315 Ecological Animal Physiology, Lectures** Fall. 3 credits. Prerequisite: one year of introductory biology for majors. Offered alternate years.

Lecs, M W F 10:10. W. N. McFarland and staff. An introductory course for students interested in ecology and physiology. The characteristics of the physical environment that are important to organisms are discussed; and representative physiological, behavioral, and morphological adaptations of vertebrate and invertebrate animals to their environments are analyzed.

**316 Cellular Physiology** Spring. 4 credits. Limited to 50 students, with preference given to students concentrating in animal physiology and anatomy. Each lab section limited to 25 students. Prerequisite: concurrent or previous enrollment in Biological Sciences 330 or 331.

Lecs, M W F 9:05; lab, M or T 1:25-5. A. Quaroni, R. A. Corradino, E. R. Loew.  
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.

**[317 Ecological Animal Physiology, Laboratory]** Fall. 1 credit. Limited to 12 students. Prerequisite: concurrent enrollment in Biological Sciences 315. Offered alternate years. Not offered 1983-84; next offered 1985-86.

Lab, W or R 1:25-4:25. W. N. McFarland. Exercises involve measurement of important environmental factors in local habitats and laboratory experiments to familiarize students with the use of ecophysiological concepts.]

**319 Introductory Animal Physiology, Laboratory (also Veterinary Medicine 348)** Fall. 2 credits. Limited to 80 students, with preference given to students concentrating in animal physiology and anatomy. Each lab section limited to 20 students. Prerequisite: concurrent enrollment in Biological Sciences 311, or permission of instructor based on previous meritorious performance in another introductory physiology course. S-U grades optional.

Lab, M T W or R 1:25-5. R. A. Corradino, P. W. Concannon.  
A series of student-run experiments exposing the objectives, ethics, techniques, and analysis of procedures in systems physiology conducted *in vivo* and *in vitro* with mammals. Reports describing the experiments and requiring extensive outside work are required. Grading is based on evaluation of reports.

**[351 Biological Rhythms with a Period of One Day to One Year]** Fall. 1 credit. Prerequisites: one year of introductory biology and either Mathematics 106, 111, or 113. Not offered 1983-84.

Lec, R 12:20. A. van Tienhoven.  
Theoretical and practical aspects of circadian and circennal rhythms are considered. Selective topics such as the biological clock of plants, insects, and vertebrates are presented. Light is considered as a stimulus and as an entraining agent. The role of rhythms on migration and reproduction is emphasized.]

**410 Seminar in Anatomy and Physiology** Fall or spring. 1 credit. May be repeated for credit only once. Limited to upperclass students. S-U grades only.

Sem to be arranged. Organizational meeting first W of each semester at 7:30 p.m. in Stimson G25. Staff (coordinator: R. H. Wasserman).

**412 Special Histology: The Biology of the Organs** Spring. 4 credits. Limited to 12 students. Prerequisite: Biological Sciences 313 or written permission of instructor. Offered alternate years.

Lecs, W F 9:05; labs, W F 2-4:25. W. A. Wimsatt. A continuation of Biological Sciences 313. The microscopic and ultrastructural organization of the principal vertebrate organ systems are studied in relation to their development, functional interaction, and special physiological roles. Courses 313 and 412 together present the fundamental aspects of the microscopic and submicroscopic organization of the vertebrate. The organization of the course involves student participation in lecture-seminars and independent project work supplementary to the regular work of the laboratory. The latter enables students to gain practical experience with histological and histochemical preparative techniques.

**[414 Vertebrate Morphology (also Veterinary Medicine 700)]** Spring. 3 credits. Prerequisite: graduate standing, or Biological Sciences 274 or equivalent. (Prerequisite waived for students concentrating in animal physiology and anatomy.) S-U grades optional. Not offered 1983-84.

Labs, T R 2-4:25. H. E. Evans.  
Student dissections of the dog serve as the basis for a functional consideration of the major component parts of the body and its organ systems. This is followed by a dissection of the cow. Other species (fish to mammal) of interest to members of the class may also be dissected.]

**[416 General Animal Physiology: A Quantitative Approach, Lectures]** Spring. 3 credits. Prerequisites: one year of college biology and physics. S-U grades optional. May not be taken for credit after Biological Sciences 311. Not offered 1983-84.

Lecs, M W F 10:10. H. C. Howland.  
The principles of animal physiology are developed through consideration of the functioning of cells, tissues, and organs. Specific topics discussed include respiration, metabolism, circulation, excretion, body mechanics, muscle contraction, nerve action, sensory reception, and central nervous system function. A quantitative, systems-theoretical approach is emphasized.]

**418 General Animal Physiology, Laboratory** Spring. 2 credits. Prerequisite: concurrent enrollment in Biological Sciences 416 or equivalent.

Lec, W 7:30 p.m.; lab, M or T 1:25-4:25. A. Dobson.  
Students are introduced to basic techniques used in the study of the physiology of animal tissues. Experiments deal with respiration, properties of muscle, circulation, activity of nerves, and osmotic phenomena.

**450 Mammalian Neurophysiology (also Veterinary Medicine 753)** Spring. 3 credits. Prerequisite: two years of college biology. Recommended: courses in biochemistry and physics.

Lec and disc, T 10:10; lab, R 1:25-4:25; additional hours to be arranged. E. L. Gasteiger.  
The anatomy and physiology of the mammalian nervous system are examined through classical and modern laboratory studies. Sensory, central integrative, and motor functions are explored primarily by electrophysiologically recording spontaneous and evoked unit and field potentials. Behavioral, pharmacological, and histological methods are used where appropriate.

**[452 Comparative Physiology of Reproduction of Vertebrates, Lectures (also Animal Science 452)]** Spring. 3 credits. Prerequisite: Animal Science 427 or permission of instructor. Not offered 1983-84.

Lecs, M W F 1:25. A. van Tienhoven.  
Sex and its manifestations. Neuroendocrinology, endocrinology of reproduction, sexual behavior, gametogenesis, fertilization, embryonic development, care of the zygote, environment and reproduction, and immunological aspects of reproduction.]

**[454 Comparative Physiology of Reproduction of Vertebrates, Laboratory (also Animal Science 454)]** Spring. 2 credits. Prerequisite: concurrent or previous enrollment in Biological Sciences 452 or permission of instructor. Not offered 1983-84.

Lab to be arranged. Organizational meeting first F of semester at 2:30. A. van Tienhoven.  
The laboratory provides students with an opportunity to design and execute independent experiments with limited objectives.]

**458 Mammalian Physiology** Spring. 6 credits. Enrollment limited. Graduate student auditors allowed in lectures. Prerequisite: Biological Sciences 311 or 416, or equivalent with written permission of instructor.

Lecs, M W F 8; lab, M or W 1:25-4:25; 4 additional hours to be arranged. K. W. Beyenbach and staff.  
Selected topics in mammalian physiology are discussed in the lecture and concurrently studied in the laboratory. Topics are selected from the following: physiology of membranes and epithelia; nerve and muscle; heart and circulation; autonomic, somatic, and sensory nervous systems; respiration; digestion; salt and water balance; acid-base balance; and endocrine regulation.

**[615 Nutrition and Physiology of Mineral Elements (also Veterinary Medicine 759 and Nutritional Sciences 659)]** Fall. 2 credits. Prerequisites: courses in basic physiology, intermediate biochemistry, and general nutrition. Offered alternate years. Not offered 1983-84.

Lecs, T R 10:10. R. Schwartz, D. R. Van Campen, R. H. Wasserman.  
Lectures on nutritional aspects and physiological, biochemical, and hormonal relationships of the prominent macroelements and microelements, with emphasis on recent developments. Information is included on methodologies of mineral research and the essentiality, requirements, transport, function, homeostasis, interrelationships, and toxicity of various mineral elements.]

**616 Radioisotopes in Biological Research (also Veterinary Medicine 750)** Fall. 4 credits. Prerequisites: courses in animal or plant physiology, or permission of instructor.

Lecs, T R 11:15; lab, T 1:25-5. F. W. Lengemann.  
Lectures and laboratories deal with the radioisotope as a tool in biological research. Among the topics considered are the use and detection of beta-emitting isotopes, gamma spectrometry, Cerenkov counting, neutron activation, autoradiography, and isotope dilution. Emphasis is placed on liquid scintillation counting, double-label experiments, and  $C^{14}$  and  $H^3$  as metabolic tracers. Experiments are designed to present basic principles, using plants and animals as subject material.

**617 Applied Electrophysiology (also Veterinary Medicine 652)** Fall. 2 credits. Open to seniors, graduate students, and second-, third-, and fourth-year veterinary students. Prerequisites: physics and two years of college biology, or permission of instructor.

Lec, W 8; lab, R 2-4:25. E. L. Gasteiger, E. R. Loew.

Theory and practice of electrophysiological techniques currently used for study of the nervous and muscular systems in normal and diseased states. Topics include electroencephalography, electromyography, electroretinography, and evoked potentials.

**618 Biological Membranes and Nutrient Transfer (also Veterinary Medicine 752)** Spring. 2 credits. Prerequisites: courses in animal or plant physiology, quantitative and organic chemistry, and physics, and permission of instructor. Recommended: courses in cellular physiology and elementary physical chemistry. S-U grades optional, with permission of instructor. Offered alternate years.

Lecs, T R 11:15. R. H. Wasserman.

An introduction to elementary biophysical properties of biological membranes; theoretical aspects of permeability and transport; and mechanism of transfer of inorganic and organic substances, primarily across epithelial membranes.

**619 Lipids (also Nutritional Sciences 602)** Fall. 2 credits. Prerequisite: Biological Sciences 330 or 331.

Lecs, T R 11:15. A. Bensadoun.

Advanced course on biochemical, metabolic, and nutritional aspects of lipids. Emphasis on critical analysis of current topics in lipid methodology; lipid absorption; lipoprotein secretion, structure, and catabolism; mechanism of hormonal regulation of lipolysis and fatty acid synthesis; and cholesterol metabolism and atherosclerosis.

**658 Molecular Mechanisms of Hormone Action (also Veterinary Medicine 758)** Spring. 2 credits. Prerequisite: permission of instructor. Offered alternate years.

Lecs, T R 10:10. R. A. Corradino.

An advanced course developed from the current literature on endocrine mechanisms.

**712-718 (711-718) Special Topics in Physiology** Fall or spring. 1 or 2 credits for each topic. May be repeated for credit. Each topic limited to 20 students, with preference given to graduate students in physiology. S-U grades optional, with permission of instructor.

Discussions and seminars on specialized topics.

Fall 1983: three topics are offered.

**713 Farm Animal Behavior (also Biological Sciences 410)** 1 credit.

Sem, 1 hour each week to be arranged.

K. A. Houpt.

**715 Evolution of Color Vision** 1 credit.

Sem, 1 hour each week to be arranged. E. R. Loew.

**717 Fish as a Subject of Physiologic Inquiry** 1 credit.

Disc, 1½ hours each week for 8 weeks to be arranged. W. N. McFarland.

Spring 1984: four topics are offered.

**712 History of Physiology: The Digestive Tract** 1 credit.

Sem, 1 hour each week to be arranged.

T. R. Houpt.

**714 Plasma Lipoproteins** 1 credit.

Sem, 1 hour each week to be arranged.

A. Bensadoun.

**716 Dependability of the Nervous System** 1 credit.

Sem, 1 hour each week to be arranged.

E. L. Gasteiger.

**718 Nutritional Pathophysiology** 1 credit.

Sem, 1 hour each week to be arranged.

F. A. Kalfeiz.

**719 Graduate Research in Animal Physiology (also Veterinary Medicine 600)** Fall or spring.

Variable credit. Prerequisites: written permission of section chairperson and staff member who supervises the work and assigns the grade. 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.

## Related Courses in Other Departments

**Adaptations of Marine Organisms (Biological Sciences 413)**

**Advanced Work in Animal Parasitology (Veterinary Medicine 737)**

**Animal Reproduction and Development (Animal Science 220)**

**Developmental Biology (Biological Sciences 385)**

**Embryology (Biological Sciences 389)**

**Fundamentals of Endocrinology (Animal Science 427-428)**

**Insect Morphology (Entomology 322)**

**Integration and Coordination of Energy Metabolism (Biological Sciences 637)**

**Neuroanatomy (Veterinary Medicine 504)**

**Parasitic Helminthology (Veterinary Medicine 440)**

**Population Biology of Health and Disease (Veterinary Medicine 330)**

**Teaching Experience (Biological Sciences 498)**

**Undergraduate Research in Biology (Biological Sciences 499)**

**Vision (Biological Sciences 395)**

## Biochemistry, Molecular and Cell Biology

**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 10:10-11:30 for first 3 S of semester.

Section chairperson and staff.

Lectures illustrate modern research and training in biochemistry and molecular and cell biology.

**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. 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.

**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 200 students each semester. Lectures given fall semester only.*

**330 Principles of Biochemistry, Individualized Instruction** Fall or spring. 4 credits. Prerequisite: Chemistry 253 or 358 or equivalent. May not be taken for credit after Biological Sciences 231 unless written permission is obtained from instructor. May not be taken for credit after Biological Sciences 331.

Discs, M W F 8 or 10:10; additional hours to be arranged. No formal lecs. Evening prelim to be arranged. Fall: M. Ferger, R. E. MacDonald, and staff; spring: M. Ferger, R. Wu, and staff.

The focal point for this course is a study center, open mornings, afternoons, and some evenings, where students find materials, get help, participate in discussions, and take exams. Students are required to master a minimum body of core material. The pace at which this material is assimilated is largely self-determined. Students who want to go beyond core material have available a wide range of electives, including discussions of research papers and independent study of selected problems and monographs. Grades are determined primarily by the amount of elective work satisfactorily completed and by a final exam.

**331 Principles of Biochemistry, Lectures** Fall, or 6-week summer session. 4 credits. Prerequisite: Chemistry 253 or 358 or equivalent. May not be taken for credit after Biological Sciences 231 unless written permission is obtained from instructor. May not be taken for credit after Biological Sciences 330.

Lecs, M W F S 10:10. B.-K. Tye, J. K. Moffat, R. Barker.

Chemistry of biological substances, presented in a lecture format. Course content is similar to that of Biological Sciences 330.

**430 Basic Biochemical Methods** Fall or spring. 4 credits. Enrollment limited. Prerequisites: Biological Sciences 330 or 331, a laboratory course in organic chemistry, and permission of instructor. May not be taken for credit after Biological Sciences 638.

Lec and disc, F 1:25; labs, M W or T R 12:20-4:25. R. R. Alexander, J. M. Griffiths, M. L. Wilkinson.

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 rotates among four modules. Various assay methods, column chromatography, and electrophoresis are taught in an enzymology module. Methods used in the clinical laboratory are used to analyze the student's own blood and urine samples, and some nutritional analyses are done for lipid and vitamin content of foods. For one three-week period there is an option of choosing a cell component or nucleic acid module. Students attending the M W section isolate and study the various organelles of rat liver cells, while students in the T R section isolate and characterize calf thymus DNA and look at some transfer RNA properties.

**432 Survey of Cell Biology** Spring, or 3-week summer session. 3 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent.

Lecs, M W F 11:15. J. T. Lis, M. V. Hinkle, and staff.

A survey of material covered in depth in Biological Sciences 438 and 483. The course covers a wide array of topics, including microscopic techniques, membrane activities, cell junctions, organelles, cell movement, cell division, chromosome structure and the control of gene expression, and cellular differentiation.

**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 optional, with permission of instructor.

Sem to be arranged. Organizational meeting first W of each semester at 4 p.m. Fall: J. M. Calvo; spring: J. K. Moffat.

Selected papers from the literature on a given topic are evaluated critically during six or seven two-hour meetings. Fall: transposable elements in prokaryotes and eukaryotes; spring: protein engineering—the impact of crystallography on biotechnology.

#### **438 Cell Proliferation and Oncogenic Viruses (also Toxicology 438)**

Spring. 2 credits.

Prerequisite: Biological Sciences 330 or 331.

Recommended: Biological Sciences 281.

Lecs, T R 12:20. V. M. Vogt.

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 carcinogens. Topics include macromolecular growth factors, contact inhibition, cell surface properties, cell cytoskeleton, transcription and translation of viral and host genes, and integration of viral DNA into host chromosomes.

**630 (434) Laboratory in Cell Biology** Spring 4 credits. Enrollment limited. Prerequisites: a course in biochemistry or cell biology, and permission of instructor. May be taken after Biological Sciences 430 or 638 by students desiring a second semester of lab experience.

Labs, M W 1:25–4:25 or R 9:05–4:25; disc to be arranged. J. Gibson and staff.

The course stresses techniques for handling and experimenting with cells of different kinds and provides experience in experimental design.

#### **631 Protein Structure and Function** Fall 2 or 3 credits (3 credits with discussion).

Prerequisites: introductory biochemistry, physical chemistry, and organic chemistry; or permission of instructor. S-U grades optional, with permission of instructor.

Lecs, M W 9:05; disc, F 9:05. G. P. Hess and staff. Lectures on protein structure and the nature of enzymatic catalysis. Discussions cover some of these areas in more depth, through recent research papers.

#### **632 Membranes and Bioenergetics** Spring. 2 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent.

Lecs, T R 11:15. P. C. Hinkle.

Structure of biological membranes, model membrane systems, ion transport enzymes, oxidative phosphorylation, and photophosphorylation. Together with Biological Sciences 636 and 639, this course provides broad coverage of the cell biology subject area.

#### **633 Biosynthesis of Macromolecules** Fall 2 credits. Prerequisite: Biological Sciences 330 or 331.

Lecs, T R 9:05. J. W. Roberts, D. B. Wilson. DNA, RNA, and protein synthesis; regulation of gene expression; and other topics.

#### **634 Biochemistry of the Vitamins and Coenzymes (also Nutritional Sciences 634)**

Spring. 2 credits. Prerequisites: Biological Sciences 330 or 331 or equivalent, and either Chemistry 358 or 360. Offered alternate years.

Lecs, T R 10:10. M. N. Kazarinoff.

The chemical, biochemical, and nutritional aspects of the vitamins and coenzymes.

#### **635 Metabolic Regulation (also Nutritional Sciences 635)** Spring. 2 credits. Prerequisites: Biological Sciences 330 or 331, and either Chemistry 358 or 360; or written permission of instructor. Recommended: physical chemistry.

Lecs, T R 9:05. M. Wattford.

The study of enzymes and the molecular mechanisms of metabolic regulation.

#### **636 Molecular Biology of the Cell: Outside the Nucleus** Spring. 2 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent.

Lecs, T R 10:10. A. P. Bretscher.

Methods in cell biology, motile systems in eucaryotes and procaryotes, the cytoskeleton, cell cycle and mitosis, internal membranes and secretion, endocytosis and exocytosis, cell adhesion and the extracellular matrix, cell interactions, cell junctions, and chemical signaling between cells. Together with Biological Sciences 632 and 639, this course provides broad coverage of the cell biology subject area.

#### **[637 Integration and Coordination of Energy Metabolism (also Nutritional Sciences 636)]** Fall 3 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent. Not offered 1983–84.

Lecs, M W F 9:05. Evening prelims to be arranged. W. J. Arion and staff.

The elements and dynamics of energy metabolism in 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 the intact animal are analyzed in the contexts of selected physiologic and pathologic stresses.]

#### **638 Intermediate Biochemical Methods** Spring 4 credits. Primarily for undergraduates majoring in biochemistry and for graduate students minoring in biochemistry. Prerequisites: Biological Sciences 330 or 331, and permission of instructor. Undergraduates must obtain permission of instructor by the last day of the course enrollment period. Graduate students should obtain permission during pre-course enrollment for the spring semester. May not be taken for credit after Biological Sciences 430.

Lab, T or R 9:05–4:25. A lab section is also scheduled W 9:05–4:25 if enrollment requires it. E. B. Keller, L. A. Heppel, and staff.

Selected experiments on proteins, enzymes, DNA, and bioenergetics to illustrate basic biochemical principles. The course emphasizes quantitative aspects and techniques currently used in biochemical research.

#### **[639 Molecular Biology of the Cell: Inside the Nucleus]** Spring. 2 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent. Not offered 1983–84; first offered spring 1985.

Lec, M 8–9:55 p.m. J. T. Lis.

Lectures concerning such topics as chromatin structure, nonhistone chromosomal proteins, the use of recombinant DNA methods to explore the organization of genes, regulation of gene expression, RNA processing, the role of the nuclear matrix in DNA replication and gene expression, the polytene nucleus as a model for defining the architecture of the interphase nucleus, and the nucleus in response to developmental signals. Together with Biological Sciences 632 and 636, this course provides broad coverage of the cell biology subject area.]

#### **[648 Plant Biochemistry]** Spring. 3 credits. Prerequisites: organic chemistry, biochemistry, and a course in plant physiology. Offered alternate years. Not offered 1983–84.

Lecs, M W F 9:05. A. T. Jagendorf, R. E. McCarty, 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.]

#### **731–736 (731–737) Current Topics in Biochemistry** Fall or spring. ½ or 1 credit for each topic. May be repeated for credit. (Students

registering for ½ credit should *not* fill in the credit-hour column on the optical-mark registration form; the computer is programmed to register students automatically for ½ credit.) Prerequisite: Biological Sciences 330 or 331 or equivalent. S-U grades only.

Lectures and seminars on specialized topics.

Fall 1983: three topics are offered.

#### **731 Proton-ATPases in Plants** ½ credit. T R 12:20 (6 lecs), Sept. 6–22. R. E. McCarty.

#### **733 Topics in Eukaryotic Gene Expression** ½ credit.

T R 12:20 (6 lecs), Sept. 27–Oct. 13. E. B. Keller.

#### **735 Chromatin** ½ credit. T R 12:20 (6 lecs), Nov. 3–22. J. T. Lis.

Spring 1984: three topics are offered.

#### **732 Biochemical Aspects of Visual Transduction** ½ credit.

T R 12:20 (6 lecs), Jan. 24–Feb. 9. A. Lewis.

#### **734 Molecular Genetics and Genetic Engineering of Plants** ½ credit.

T R 12:20 (6 lecs), Mar. 6–22. A. A. Szalay.

#### **736 Communication between Nerve Cells** ½ credit.

T R 12:20 (6 lecs), Apr. 17–May 3. G. P. Hess.

#### **751 Dilemmas in Toxicology (also Toxicology 751)** Fall. 2 credits. Prerequisites: advanced graduate standing and permission of instructor.

S-U grades optional.

Sem, 2 hours each week to be arranged.

Organizational meeting first F of semester at 12:20. J. M. Fessenden-Raden.

Discussions of case studies of dilemmas faced by practicing scientists in chemical and biochemical fields in academia, industry, and government. Readings of scientific, ethical, and general papers provide background for discussions. Topics for consideration include laboratory safety, testing in animals, conflicts of interest/commitment, data presentation, secrecy in science, impact of regulations on science, and professional codes of ethics.

#### **[752 Isotope Kinetics (also Nutritional Sciences 682)]** Spring. 2 credits. Prerequisite: one year of calculus. Recommended: some knowledge of differential equations. S-U grades only. Offered alternate years. Not offered 1983–84.

Lec, T 7:30–9:30 p.m. D. B. Zilversmit. Quantitative analysis of the transport and distribution of nutrients, metabolites, and drugs in multicompartmental systems. The material is presented as lectures, discussion groups, and problem sets.]

#### **830 Biochemistry Seminar** Fall or spring. No credit.

Sem, F 4:15. Staff.

Lectures on current research in biochemistry, presented by distinguished visitors and staff members.

#### **831 Advanced Biochemical Methods I** Fall. 6 credits. Limited to graduate students majoring in biochemistry.

Labs and discs, 12 hours each week to be arranged. Organizational meeting first R of semester at 10:10. D. B. Wilson and staff.

To learn the basic techniques of biochemical research, each student completes a set of experiments.

#### **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: P. C. Hinkle).

Research in the laboratories of two or three different professors chosen by the student. Arrangements are made jointly between the field representative and the research adviser.

**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, graduate students (first-year students excepted) majoring in biochemistry. S-U grades only.

Sem, M 5–6:30 p.m. V. M. Vogt, J. K. Molfat, P. C. Hinkle

#### Related Courses in Other Departments

#### Lipids (Biological Sciences 619)

#### Molecular Aspects of Development (Biological Sciences 483)

#### Molecular Mechanisms of Hormone Action (Biological Sciences 658)

#### Teaching Experience (Biological Sciences 498)

#### Undergraduate Research in Biology (Biological Sciences 499)

## Botany

**241 Plant Biology** Fall. 3 credits. Enrollment may be limited, with preference given to sophomores and juniors majoring in agronomy, botany, environmental education, floriculture, horticulture, natural resources, plant sciences, vegetable crops, and wildlife. Prerequisite: one year of introductory biology for majors or equivalent.

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. Lab practicum hours to be arranged (Oct. 19–21). K. J. Niklas.

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.*

**242 Plant Physiology, Lectures** Spring. 3 credits. Primarily for undergraduates in agricultural sciences. Prerequisites: one year of introductory biology and introductory chemistry; concurrent enrollment in Biological Sciences 244 or written permission of instructor required for undergraduates. May not be taken for credit after Biological Sciences 341 unless written permission is obtained from instructor.

Lecs, M W F 10:10. Staff.

Plant physiology as applied to plants growing in communities. Examples deal with crop plants or higher plants where possible, though not exclusively. Topics include cell structure and function; plant metabolism, including photosynthesis; soil-plant-water relations; water uptake, transport, and transpiration; irrigation of crops; sugar transport; mineral nutrition of crops; respiration and photosynthesis; light relations in crops; growth and development—hormones, flowering, fruiting, dormancy, and abscission; and chemical control of plant growth.

**244 Plant Physiology, Laboratory** Spring. 2 credits. Prerequisite: concurrent enrollment in Biological Sciences 242. May not be taken for credit after Biological Sciences 349.

Lab, M T W or R 1:25–4:25; disc, M T W or R 12:20. Lab and disc must be on same day. 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.

**[246 Ethnobotany** Spring. 3 credits. Limited to 20 students. Prerequisite: written permission of instructor. Not offered 1983–84.

Lecs, T R 11:15; lab, R 2–4:25. D. M. Bates. A consideration of the role of plants in primitive and lay societies, with emphasis on the nature of the plant resource base, the manner in which man uses this base, and the extent to which it enters his folklore and has influenced his cultural development. Laboratories provide a practical introduction to the plant kingdom by stressing plant organization and identification and plant crafts.]

**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 and M 7:30 p.m. A. T. Jagendorf, A. C. Leopold.

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.

#### 342 Taxonomy of Cultivated Plants (also Floriculture and Ornamental Horticulture 342)

Spring. 4 credits. Prerequisite: one year of introductory biology or written permission of instructor. May not be taken for credit after Biological Sciences 343.

Lecs, M W 10:10; labs, M W 2–4:25. J. W. Ingram. 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 analytical keys. Attention is also given to the economic importance of taxa, to the basic taxonomic literature, and to the elements of nomenclature.

**343 Taxonomy of Vascular Plants** Fall. 4 credits. Prerequisites: one year of introductory biology and written permission of instructor. May not be taken for credit after Biological Sciences 342.

Lecs and discs, T R 9:05; labs, M W or T R 2–4:25. M. D. Whalen.

An introduction to the classification of vascular plants, with attention to principles, methods of identification, and literature. Field trips are held during laboratory periods in the first half of the term.

**345 Plant Anatomy** Fall. 4 credits. Limited to 48 students. Prerequisite: one year of introductory biology or a semester of botany.

Lecs, M W 9:05; labs, M W 2–4:25 or T R 10:10–12:35. 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.

**347 Cytology** Fall. 4 credits. Prerequisite: one year of introductory biology for majors. Recommended: Biological Sciences 281.

Lecs, M W 9:05; labs, M W or T R 10:10–12:35. C. H. Uhl.

A study primarily of the structure of cells and their components and the relation of these to function and heredity. Special attention is given to chromosomes. Both plant and animal materials are used.

**[348 Phycology** Fall. 4 credits. Not offered 1983–84.

Lecs, M W F 10:10; lab, M W or F 2–4:25. Staff. An introduction to freshwater and marine algae, including consideration of their ecology as members of the plankton and benthos and their importance to man. The laboratory uses field material and cultures from an extensive living collection to illustrate lecture topics, provide familiarity with algae in the field, and introduce the student to techniques used in isolating, culturing, and studying algae in the laboratory.]

**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 or R 1:25–4:25; disc, W or R 12:20. Lab and disc must be on same day. 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.

**353 Evolution of Photosynthetic Apparatus: Algae to Higher Plants** Fall. 3 credits. Prerequisite: one year of introductory biology. S-U grades optional. Offered fall 1983 only.

Lecs, T R 10:10–11:30. E. Gantt. The structural and functional development of the photosynthetic apparatus, from photosynthetic prokaryotic cells to higher plants. Algal structure is emphasized, since the greatest diversity in thylakoid structure and accessory pigment variety exists in the various algal groups.

**[440 Plant Geography** Spring. 2 credits. Prerequisite: Biological Sciences 343 or equivalent. Recommended: Biological Sciences 463 or 477 or both. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1983–84.

Lecs, T R 10:10. D. A. Young. 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.]

**442 Biology of Plant Species** Spring. 2 credits. Prerequisite: Biological Sciences 343 or equivalent. Recommended: Biological Sciences 463 and 477. S-U grades optional, with permission of instructor. Offered alternate years.

Lecs, T R 10:10. M. D. Whalen. 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.

**[443 Research Methods in Systematic Botany** Fall. 2 credits. Limited to 10 students. Prerequisite: Biological Sciences 343 or equivalent. Offered alternate years. Not offered 1983–84.

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.]

**444 Comparative and Developmental Morphology of the Embryophyta** Spring. 4 credits. Prerequisite: Biological Sciences 345. Offered alternate years.

Lecs, T R 8; labs, T R 2–4:25. D. J. Paolillo.



The life histories of bryophytes, vascular cryptograms, and seed plants are examined for their developmental attributes and for their bearing on concepts of evolution and group relationships. The course content is designed to develop an awareness of the integration between morphology and other disciplines in biology.

**[445 Photosynthesis (also Applied and Engineering Physics 601)]** Fall. 3 credits. Prerequisites: Chemistry 104 or 208; Mathematics 106, 111, or 113; and either Physics 102 or 208; or permission of instructor. Offered alternate years. Not offered 1983–84.

Lecs, M 1:25 and T R 10:10. R. K. Clayton. A detailed study of the process by which plants use light in order to grow; physical and physicochemical aspects of the problem are emphasized.]

**[446 Cytogenetics]** Spring. 3 credits. Prerequisites: Biological Sciences 281 and 347, or their equivalents. Offered alternate years. Not offered 1983–84.

Lecs, M W 9:05; lab, M or W 10:10–12:35. C. H. Uhl. Deals mainly with the cellular mechanisms of heredity, including recent research in cytology, cytogenetics, and cytotaxonomy.]

**448 Plant Evolution and the Fossil Record** Spring. 3 credits. Prerequisite: Biological Sciences 241 or equivalent, or written 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.

**640 Applied Plant Anatomy** Spring. 3 credits. Prerequisites: Biological Sciences 345 or equivalent, and permission of instructor.

Lecs and discs, T R 9:05; lab, W 10:10–1:10 or by arrangement with instructor. N. W. Uhl. The use of anatomy in vascular plants for diagnosis of structure, taxonomic relationships, evolutionary sequences, and ecological adaptations, with emphasis on recent research. The laboratory provides experience in techniques and interpretation.

**642 Topics in Ultrastructure of Plant Cells** Spring. 3 credits. Primarily for graduate students, although upperclass students with adequate background are allowed to enroll. No auditors. Prerequisites: Biological Sciences 345 or 347, and written permission of course coordinator. Offered alternate years.

Lecs, M W F 10:10; optional disc, F 1:25 or to be arranged. Staff (coordinator: M. V. Parthasarathy). An advanced course dealing with organelles in depth, and in breadth where necessary. Topics include salient ultrastructural features of some plant groups and certain specialized cells and processes. Content of the course and staff direction vary to some extent from year to year.

**643 Plant Physiology, Advanced Laboratory Techniques** Fall. 4 credits. Primarily for graduate students in the plant sciences. 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 and staff. An introduction to some modern methods in experimental plant biology.

**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. Lec, M W F 9:05. A. C. Leopold, 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.

**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. D. A. Young. 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.

**[646 Families of Tropical Flowering Plants: Field Laboratory]** Intersession. 3 credits. Limited to 20 students, with preference given to seniors and graduate students from member institutions of the Organization for Tropical Studies. Prerequisite: Biological Sciences 342 or 343 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. Not offered 1983–84.

Bailey Hortorium staff. 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.]

**647 Seminar in Systematic Botany** Spring. 1 credit. May be repeated for credit. Prerequisite: written permission of course coordinator required for undergraduates. S-U grades optional.

Sem to be arranged. Organizational meeting first F of semester at 1:25. Staff (coordinator: D. A. Young).

Lectures and discussions led by staff, visitors, and students on topics of current importance to systematic botany.

**[648 Plant Biochemistry]** Spring. 3 credits. Prerequisites: organic chemistry, biochemistry, and a course in plant physiology. Offered alternate years. Not offered 1983–84.

Lecs, M W F 9:05. A. T. Jagendorf, R. E. McCarty, 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.]

**649 Transport of Solutes and Water in Plants** Fall. 3 credits. Prerequisite: Biological Sciences 341 or equivalent. Offered alternate years.

Lecs, M W F 10:10. 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.

**[651 Quantitative Whole-Plant Physiology]** Fall. 3 credits. Prerequisites: introductory physics, calculus, and plant physiology. S-U grades only. Offered alternate years. Not offered 1983–84.

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.]

**[652 Botanical Latin]** Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades optional. Offered alternate years. Not offered 1983–84.

Lec and disc to be arranged. W. J. Dress. Basic grammar and vocabulary and exercises in writing and reading the Latin of plant taxonomy, as well as applications to botanical nomenclature.]

**[654 Plant Nomenclature]** Fall. 1 credit. Prerequisite: written permission of instructor. Recommended: concurrent enrollment in Biological Sciences 652. S-U grades optional. Offered alternate years. Not offered 1983–84.

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.]

**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 designated 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.

**657 Literature of Taxonomic Botany** Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades optional. Offered alternate years.

Lec and disc, R 10:10. J. W. Ingram. 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.

**740 Plant Biology Seminar** Fall and spring. No credit (no official registration). Required of graduate students doing work in plant physiology.

Sem, F 11:15. Staff. Lectures on current research in plant biology, presented by visitors and staff.

**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.

**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

**Mycology (Plant Pathology 709)**

**Mycology Conferences (Plant Pathology 649)**

**Field Phycology (Biological Sciences 441)**

**Introductory Mycology (Plant Pathology 309)**

**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, Systematics, and Evolution

### 260 Introductory Ecology Fall. 3 credits.

Prerequisite: one year of introductory biology or written permission of instructor. May not be taken for credit after Biological Sciences 360.

Lecs, T R 11:15; disc, T or R 1:25, 2:30, or 3:35.  
C. A. S. Hall and staff.

An introduction to biological phenomena that occur at the population, community, and ecosystem levels of organization. The relevance of ecological principles to current environmental and resource problems is examined.

**274 The Vertebrates** Spring. 5 credits. Primarily for sophomores; this course is a prerequisite or recommended course for many advanced courses in vertebrate biology, anatomy, and physiology. Each lab limited to 21 students. Prerequisite: one year of introductory biology for majors. Fee, \$10.

Lecs, T R 10:10; labs, M W 1:25–5, M W 7–10 p.m., or TR 1:25–5. Evening prelim to be arranged. Staff.

An introduction to the evolution, classification, comparative anatomy, life history, and behavior of vertebrate animals. Laboratory dissection and demonstration are concerned with structure, classification, systematics, biology of species, and studies of selected aspects of vertebrate life.

**360 General Ecology** Fall or spring. 3 credits. For students concentrating in ecology or a related subject. Not open to freshmen in fall semester. Prerequisite: one year of introductory biology for majors. May not be taken for credit after Biological Sciences 260.

Lecs, T R 9:05; disc, W or R 1:25, 2:30, or 3:35.  
Fall: P. L. Marks and staff; spring: R. B. Root, B. F. Chabot.

Principles concerning the interactions between organisms and their environment; influence of competition, predation, and other factors on population size and dispersion; analysis of population structure and growth; processes of speciation; interspecific competition and the niche concept; succession and community concepts; influence of climate and past events on the diversity and stability of communities in different regions of the world; and role of energy flow and biogeochemical cycling in determining the structure and productivity of ecosystems. Modern evolutionary theory is stressed throughout, and attention is given to conflicting ecological hypotheses.

**371 Human Paleontology** Fall. 4 credits.

Prerequisite: one year of introductory biology or Anthropology 114, or permission of instructor.

Lecs, M W F 2:30; lab, 1 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 primate phylogeny.

**455 Insect Ecology, Lectures (also Entomology 455)** Fall. 2 credits. Prerequisites: Biological Sciences 360 and Entomology 212, or their equivalents. Recommended: concurrent enrollment in Biological Sciences 457. Offered alternate years.

Lecs W F 11:15. 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.

**457 Insect Ecology, Laboratory (also Entomology 457)** Fall. 2 credits. Limited to 16 students.

Prerequisite: concurrent enrollment in Biological Sciences 455. Offered alternate years.

Lab, W 1:25–4:25; plus F or S field trips to be arranged during the field season. R. B. Root.  
Field exercises focus on insect natural history and methods of sampling populations. Laboratories devoted to rearing insects, estimating life-table parameters, and analyzing communities.

**459 Biology of Parasitism (also Veterinary Medicine 787)** Spring. 2 credits. Prerequisite:

one year of introductory biology for majors. Recommended: Biological Sciences 260 or 360 or equivalent. S-U grades optional.

Lecs, M W 2:30. D. L. Wasson.  
An exploration of the biology of parasitism, with emphasis on the ecological and evolutionary aspects of host-parasite interactions. Topics include the evolution of host-parasite systems, the ecology of parasitism, structural and physiological adaptations for parasitism, and the ecology of parasitic disease. The course is suitable for upper-division undergraduates and graduate students with interests in parasitology, ecology, and human or veterinary medicine.

**[461 Oceanography** Fall. 3 credits. Prerequisites: college physics and either Biological Sciences 260 or 360, or written permission of instructor. S-U grades optional. Not offered 1983–84.

Lecs, T R 10:10; additional lec, R 12:20, alternating with disc, T or R 1:25. J. P. Barlow.

A general introduction to the oceans, with emphasis on physical and chemical processes that interact with marine communities. Discussions use case studies from current literature to illustrate application to problems in biological oceanography. Field techniques and analytical methods are demonstrated.]

**462 Limnology, Lectures** Spring. 3 credits.

Prerequisite: Biological Sciences 260 or 360, or written permission of instructor.

Lecs, M W F 11:15. Staff.  
A study of the interaction of biological communities and their aquatic environment. The physical, chemical, and biological dynamics of freshwater ecosystems.

**463 Plant Ecology, Lectures** Fall. 3 credits.

Prerequisites: two advanced-level courses in biology, including Biological Sciences 360, or written permission of instructor. Recommended: some taxonomic familiarity with vascular plants and concurrent enrollment in Biological Sciences 465.

Lecs, M W F 11:15. D. Rabinowitz, P. L. Marks.  
Principles of plant-environment interactions in relation to the evolution, distribution, structure, and functioning of plants and plant communities.

**464 Limnology, Laboratory** Spring. 2 credits.

Prerequisite: concurrent or previous enrollment in Biological Sciences 462.

Lab, T W R or F 1:25–4:25; 1 weekend field trip. Staff.  
Field trips and laboratories devoted to studies of aquatic ecosystems.

**465 Plant Ecology, Laboratory** Fall. 1 credit.

Prerequisite: concurrent enrollment in Biological Sciences 463 or equivalent background in plant ecology.

Lab, F 12:05–5. D. Rabinowitz, P. L. Marks.  
Laboratory and field exercises in plant ecology. Field studies of plant communities and techniques for the analysis of community data are emphasized.

**[466 Microbial Ecology (also Agronomy 466 and Microbiology 466)]** Spring. 3 credits. Prerequisite:

an elementary course in some facet of microbiology. Offered alternate years. Not offered 1983–84.

Lecs, M W F 10:10. M. Alexander.  
An introduction to the basic principles of microbial ecology. Attention is given to the behavior, activity, and interrelationships of bacteria, fungi, algae, and protozoa in natural ecosystems.]

**468 Systems Ecology** Fall. 4 credits. Prerequisite: Biological Sciences 260 or 360 or equivalent. Recommended: Computer Science 102 and calculus. S-U grades optional. Offered alternate years.

Lecs, M W F 10:10; disc, T or R 2:30–4:05; 1 weekend field trip required at beginning of course. C. A. S. Hall.

An introduction to the quantitative study of populations, communities, and ecosystems. Emphasis on the development and validation of computer models based on component interactions and entire systems. Frequently there is an applied orientation. Topics covered include relevant ecological principles, system diagramming, rudimentary mathematical techniques, simulation modeling, and the use of analog and digital computers. Format includes student presentations and guest lectures describing individual case histories in which a variety of methods were used for ecological analysis, simulation, or prediction. Each student is required to develop an original computer model.

**469 Agriculture, Society, and the Environment (also Agriculture and Life Sciences 469)** Spring

3 credits. Prerequisite: one year of introductory biology or permission of instructor.

Lecs, T R 12:20; disc, W evenings and by arrangement. D. Pimentel and staff.

This course stresses the importance of an ecological approach to agriculture. Included are assessments of the interrelationships of land and water management, soil productivity, plant breeding, livestock production, pest control, energy, economics, rural sociology, environmental pollution, and ecosystems. Agricultural ecology offers opportunities for sustainable effective use of natural resources for food production for the United States and the world in future decades.

**471 Mammalogy** Fall. 4 credits. Recommended:

Biological Sciences 274. S-U grades optional, with permission of instructor. Offered alternate years. Fee, \$15.

Lecs, M W F 9:05; lab, M or T 1:25–4:25; 1 weekend field trip required. Staff.

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.

**472 Herpetology** Fall. 4 credits. Recommended:

Biological Sciences 274. S-U grades optional, with permission of instructor. Offered alternate years. Fee, \$5.

Lecs and labs, T R 12:20–4:25; occasional field trips and special projects. 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.

**474 Laboratory and Field Methods in Human**

**Biology** Spring. 4 credits. Prerequisite: one year of introductory biology or Anthropology 114, 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, the human paleontological record, description of skeletal and living subjects, paleopathology, skeletal maturation, and relevant field techniques for the archaeologist and forensic anthropologist.

**[475 Ornithology** Fall. 4 credits. Recommended:

Biological Sciences 274. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1983–84.

Lecs and labs, T R 12:20–4:25; occasional field trips and special projects. T. J. Cade.

Lectures cover various aspects of the biology of birds, including anatomy, physiology, classification, evolution, migration and orientation, behavior, ecology, and distribution, and are fully integrated with laboratory studies. Laboratory includes studies of external and internal morphology, pterylosis, molts and plumages, specimen identification of birds of New York, and families of birds of the world. Several demonstration periods emphasize hybridization, evolution, adaptive radiation, mimicry, and geographic variation.]

**[476 Biology of Fishes]** Fall. 4 credits.

Prerequisite: Biological Sciences 274, or equivalent experience in vertebrate zoology with written permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1983–84.

Lecs, M W F 9:05; lab to be arranged.

A. R. McCune.

An introduction to the study of fishes: their structure, classification, evolution, distribution, ecology, physiology, and behavior.]

**[477 Organic Evolution]** Fall. 4 credits.

Prerequisite: Biological Sciences 281 or permission of instructor. Recommended: Biological Sciences 260 or 360.

Lecs, T R 11:15; lec or disc, R 12:20; optional sessions to be arranged. P. F. Brussard.

Lectures and class discussions on organic evolution, including the origin of life, genetic mechanisms, the properties of populations, the ways in which adaptation and speciation occur, and the resultant major patterns of organic diversity.

**[478 Biology of Fishes, Laboratory]** Fall. 1 credit.

Limited to 15 students. Prerequisite: concurrent enrollment in Biological Sciences 476. Offered alternate years. Not offered 1983–84.

Lab, M 1:25–4:25; plus irregular hours as required for experiments and some required field trips.

A. R. McCune.

Laboratory and fieldwork on structure, identification, ecology, physiology, and behavior of fishes, with emphasis on local species.]

**[660 Field Studies in Ecology and Systematics]**

[Fall] or spring. Variable credit. Prerequisites: Biological Sciences 260 or 360, a taxon-oriented course, and permission of instructor. Estimated cost of room and board (exclusive of transportation) to be announced. Not offered fall 1983; offered spring 1984 only.

Lecs and labs to be arranged. R. B. Root.

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 either during intercession 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.

**[661 Environmental Biology (also Agriculture and Life Sciences 661)]**

Fall or spring. 2 or 3 credits each term. Limited to 12 students. Prerequisite: permission of instructor.

Hours 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 energy and environmental problems. The research team spends two semesters preparing a report for publication, modeled after National Academy of Sciences reports.

**[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. Not offered 1983–84.

Lecs, M W F 12:20. S. A. Levin, C. E. McCulloch. 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.]

**[664 Seminar in Coevolution between Insects and Plants (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. Not offered 1983–84.

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.]

**[665 Limnology Seminar]** Fall. 1 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.

A seminar course on advanced limnological topics.

**[666 Marine Ecology]** Spring. 3 credits.

Prerequisite: Biological Sciences 260 or 360, or written permission of instructor. Recommended: Biological Sciences 461. S-U grades optional.

Lecs, M W F 9:05. J. P. Barlow.

An introduction to biological oceanography, including adaptation of organisms to marine environments, organization of pelagic and benthic communities, and dynamics of marine ecosystems, with some special consideration of current research in coastal and estuarine regions.

**[667 Topics in Theoretical Ecology]** Fall. 3 credits

Primarily for graduate students; permission of instructor required for undergraduates. Prerequisite: one year of calculus. Recommended: Biological Sciences 662. S-U grades optional. Offered alternate years. Not offered 1983–84.

Lecs, 3 hours each week to be arranged.

S. A. Levin.

Current and classical theoretical issues in ecology and evolutionary biology. Biological issues are emphasized, although mathematical models are utilized throughout as tools to address those issues. Lectures cover both standard material and current journal articles.]

**[668 Phytoplankton Ecology: An Experimental Approach]**

Spring. 2 credits. Prerequisites: Biological Sciences 360 and Agronomy 410, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1983–84.

Lecs and discs to be arranged. G-Y. Rhee.

Ecological observations in nature interpreted with respect to the findings of algal culture studies. Emphasis is placed on photosynthesis, nutrient limitation, temperature, irradiance, diel periodicity, and other physiological and environmental variables. The theory and use of various culture methods are also emphasized.]

**[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. P. L. Marks.

Includes review of current literature, student research, and selected topics of interest to participants

**[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. Vertebrate biology staff. Seminar presentations and discussions by students on areas of current research in vertebrate biology. Topics vary from semester to semester.

**[673 (479) Human Evolution: Concepts, History, and Theory]**

Fall. 3 credits. Prerequisite: one year of introductory biology or Anthropology 114, or permission of instructor. Not offered 1983–84.

Sem, W 7:30–9:30 p.m.; additional hours to be arranged. 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 sciences is reviewed.]

**[674 Principles of Systematics (also Entomology 674)]**

Spring. 4 credits. Limited to 15 students. Prerequisite: permission of instructor. Recommended: an introductory biological systematics course.

Lecs and labs, M W 1:25–4:25; disc to be arranged. 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 finding characters (e.g., comparative morphology, karyology, electrophoresis, ontogenetic sequencing) and various methods of analysis of data, including cladistic hand and computer methods and numerical methods. Laboratory grade is based in part on a final paper.

**[676 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.

**[671 Seminar in Population and Community Ecology]**

Spring. 1 credit. May be repeated for credit. Prerequisite: permission of instructor. S-U grades optional.

Sem, T 4:25. S. A. Levin and staff.

A seminar course on selected topics in population and community ecology. Topics vary from year to year.

**[675 Autecology]** Fall. 3 or 4 credits (4 credits with term paper). Offered alternate years.

Lecs, M W F 9:05. B. F. Chabot and staff.

Comparison of the responses and adaptations of organisms to environment in selected ecosystems. Emphasis on similarities and differences in molecular and organismal mechanisms by which plants and animals cope with their environments.

**[676 Population Ecology]**

Spring. 3 or 4 credits (4 credits with term paper). Prerequisite: graduate standing with some background in calculus, statistics, ecology, and evolutionary theory; or written permission of instructor. Offered alternate years. Not offered 1983–84.

Lecs and discs, M W F 9:05. Staff.

Critical examination of the properties and dynamics of populations. Emphasis on theories of population structure, dynamics, and regulation. Discussion of experimental approaches to analyses of natural populations.]

**[677 Community Ecology]**

Fall. 3 or 4 credits (4 credits with term paper). Prerequisite: Biological Sciences 360 or equivalent, or written permission of instructor. Offered alternate years. Not offered 1983–84.

Lecs, T R 10:10–12:05. D. Rabinowitz.

The structure and dynamics of natural communities; patterning and sampling problems; species diversity; niches and gradient relations; and ordination, classification, succession, climax, and disturbance. Comparative aspects of terrestrial, marine, and freshwater communities are stressed.]

**[768 Ecosystems]** Spring. 3 or 4 credits (4 credits with term paper). Prerequisite: Biological Sciences 360 or equivalent, or written permission of instructor. Offered alternate years. Not offered 1983–84.

Lecs, T R 10:10–12:05. C. A. S. Hall and staff. Analysis of ecosystems in terms of energy flow, biogeochemistry, and model systems. Emphasis on the functional properties of ecosystems, from simple systems to the biosphere as a whole.]

**Population Biology of Health and Disease (Veterinary Medicine 330)** Spring. 3 or 4 credits (4 credits with either lab exercises or library research).

Lecs, T R 11:15; disc and demonstration, T 2–3:30. J. H. Whitlock and staff.

An integrative study of the problems of health and disease in populations of humans, plants, and animals. Examples are drawn from the whole symbiotic spectrum. Parasitoses that result in disease are demonstrated to have comparable structures and functions. These structures and functions are examined as adaptive phenomena from ecological, genetic, sociological, and economic points of view. In the demonstrations, specific diseases or symbioses are presented for discussion either through the medium of motion pictures or by specialists (such as epidemiologists, virologists, plant nematologists, and insect pathologists) from the Cornell staff.

#### Related Courses in Other Departments

**Advanced Soil Microbiology (Agronomy 606)**

**Advanced Work in Animal Parasitology (Veterinary Medicine 737)**

**Animal Parasitology (Veterinary Medicine 510)**

**Biology of Plant Species (Biological Sciences 442)**

**Early People: Human Cultural and Biological Evolution (Anthropology 203 and Archaeology 203)**

**Ecological Animal Physiology, Lectures and Laboratory (Biological Sciences 315 and 317)**

**Ecology and Human Adaptation (Anthropology 375)**

**Energy and Ecological Systems (Biology and Society 404)**

**Invertebrate Paleontology and Biostratigraphy (Geological Sciences 471)**

**Invertebrate Zoology (Biological Sciences 212)**

**Marine Sciences Courses (Biological Sciences 363–370, 467, 473)**

**Paleobiology (Geological Sciences 617)**

**Parasitic Helminthology (Veterinary Medicine 440)**

**Phycology (Biological Sciences 348)**

**Plant Geography (Biological Sciences 440)**

**Plant Nematology (Plant Pathology 646)**

**Related Courses in Entomology (Entomology 212, 331, 332, 370, 453, 471, 621, 631, 633, 634, 635, 636, 672)**

**Related Courses in Natural Resources (Natural Resources 302, 330, 430, 600, 603, 614)**

**Soil Microbiology, Lectures (Agronomy 406)**

**Systematics and the Bionomics of Animal Parasites (Veterinary Medicine 332)**

**Taxonomy of Vascular Plants (Biological Sciences 343)**

#### Teaching Experience (Biological Sciences 498)

**Topics in Ecological Anthropology: Food Production and Social Organization (Anthropology 677)**

**Undergraduate Research in Biology (Biological Sciences 499)**

**Vertebrate Social Behavior (Biological Sciences 427)**

## Genetics and Development

**281 Genetics** Fall or spring. 5 credits. Not open to freshmen in fall semester. Enrollment may be limited to 200 students. Prerequisite: one year of introductory biology or equivalent. Students who have taken Biological Sciences 282 may register only with written permission of instructor. No admittance after first week of classes.

Lecs, T R 10:10–12:05; lab, M T W or R 2:30–4:25; additional hours to be arranged. Lab sections may also be scheduled T or R 8–9:55, W or F 10:10–12:05, F 2:30–4:25, or S 10:10–12:05 if enrollment requires it. Students do not choose lab sections during course enrollment; lab assignments are made during first day of classes. Staff.

A general study of the fundamental principles of genetics in eucaryotes and procaryotes. 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. In the laboratory, students perform experiments with microorganisms and conduct an independent study of inheritance in *Drosophila*.

**282 Human Genetics** Spring. 3 credits. Each disc section limited to 25 students. Prerequisite: one year of introductory biology or equivalent. Students who have taken Biological Sciences 281 may register only with written permission of instructor.

Lecs, M W 10:10; disc, R or F 10:10 or 11:15 (1 disc section R 10:10, 2 sections R 11:15, 4 sections F 10:10, and 1 section F 11:15). A. M. Srb.

An introduction to biological heredity through consideration of human genetics. Advances in the science of genetics are having a profound effect on our understanding of ourselves and on our potential for influencing our present and future well-being. The course is intended primarily to contribute to the student's general education in these matters. Although certain aspects of genetics are considered with some rigor, the course is not designed to serve as a prerequisite to advanced courses in genetics.

**385 Developmental Biology** Fall. 3 credits. Prerequisite: Biological Sciences 281.

Lecs, M W F 11:15. A. W. Blackler. Morphogenetic, cellular, and genetic aspects of the developmental biology of animals.

**[389 Embryology]** Spring, also offered during the 6-week summer session in odd-numbered years. 4 credits. Prerequisite: one year of introductory biology. Offered alternate years. Not offered 1983–84.

Lecs, M W 11:15; labs, M W 2–4:25. A. W. Blackler. A course in the embryonic development of animals, with emphasis directed to the vertebrate groups and to the comparative aspects of morphogenesis and function. Invertebrate material is used on occasion to illustrate embryological principles. The laboratory has a strong morphogenetic theme, and stresses the comparative aspects of developmental anatomy.]

**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. M. F. Wolfner.

**[481 Population Genetics]** Fall. 3 credits. Prerequisite: Biological Sciences 281 or equivalent. Not offered 1983–84.

Lecs, M W 10:10. Staff. A study of factors that influence the genetic structure of Mendelian populations and that are involved in race formation and speciation.]

**[483 Molecular Aspects of Development]** Spring. 3 credits. Prerequisite: Biological Sciences 330 or 331. Offered alternate years. Not offered 1983–84.

Lecs, M W F 11:15. Staff. An examination of the molecular biology of developing systems. Emphasis on understanding the mechanisms involved in gene expression in developing systems, both at the transcription and translation levels. Specific topics include regulation of RNA synthesis and use, nucleio-cytoplasmic interactions, and induction of cell-specific protein synthesis. Examples are discussed from both higher and lower eucaryotic systems.]

**484 Molecular Evolution** Spring. 3 credits. Prerequisites: Biological Sciences 281 and organic chemistry. Offered alternate years.

Lecs, T R 11:15. R. J. MacIntyre. An analysis of evolutionary changes in proteins and nucleic acids, and gene-enzyme variability in natural populations. The role of natural selection in effecting these changes and maintaining genetic variation at the molecular level is critically examined. Theories on the evolution of the genetic code and the construction of phylogenetic trees from biochemical data are discussed.

**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.

**486 Immunogenetics (also Animal Science 486)**

Spring. 4 credits. Enrollment limited. Prerequisites: Biological Sciences 281 or Animal Science 221, and a course in immunology or permission of instructor.

Lecs, M W F 10:10; disc, W or R 12:20. R. R. Dieter.

The genetic control of a variety of cellular antigens and their use in understanding biological and immunological functions. The genetics of antibody diversity, antigen recognition, immune response, transplantation, and disease resistance are discussed.

**487 Microbial Genetics, Laboratory** Fall. 3 credits. Primarily for upperclass students. Limited to 20 students. Prerequisites: concurrent or previous enrollment in Biological Sciences 485, Microbiology 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.

**780 Current Topics in Genetics** 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. T. D. Fox. 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.

#### Related Courses in Other Departments

**Animal Cytogenetics (Animal Science 419)**

**Behavioral Neurogenetics (Biological Sciences 624)**

**Current Topics in Biochemistry (Biological Sciences 731–736)**

**Cytogenetics (Biological Sciences 446)**

**Cytology (Biological Sciences 347)**

**Invertebrate Embryology (Biological Sciences 482)**

**Organic Evolution (Biological Sciences 477)**

**Physiological Genetics of Crop Plants (Plant Breeding 605)**

**Plant Growth and Development (Biological Sciences 644)**

**Teaching Experience (Biological Sciences 498)**

**Undergraduate Research in Biology (Biological Sciences 499)**

## Neurobiology and Behavior

**221 Neurobiology and Behavior I: Introduction to Behavior** Fall. 3 or 4 credits (4 credits with discussion and term paper). 4-credit option is required of students concentrating in neurobiology and behavior. Each disc section limited to 20 students, with preference given to students concentrating in neurobiology and behavior. 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.  
S. T. Emlen.

A general introduction to the field of behavior and integrative neuroscience. Topics include evolution and behavior, behavioral ecology, altruism, communication, neuroethology, rhythmicity, orientation and navigation, and neural mechanisms of behavior.

**222 Neurobiology and Behavior II: Introduction to Neurobiology** Spring. 3 or 4 credits (4 credits with discussion and term paper). 4-credit option is required of students concentrating in neurobiology and behavior. Each disc section limited to 20 students, with preference given to students concentrating in neurobiology and behavior. Prerequisite: one year of introductory biology for majors. May be taken independently of Biological Sciences 221. S-U grades optional.

Lecs, M W F 12:20; disc to be arranged. R. R. Hoy.  
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, and learning and memory.

**322 Hormones and Behavior (also Psychology 322)** Spring. 3 or 4 credits (4 credits with discussion and term paper). Primarily for upperclass students; permission of instructor required for sophomores. Prerequisites: one year of introductory biology, and Biological Sciences 221 or a course in psychology. S-U grades optional.

Lecs, T R 10:10–11:30; disc to be arranged.  
E. Adkins Regan, T. DeVogd.

The relationship between endocrine and neuroendocrine systems and the behavior of animals, including humans. Major emphasis is on sexual, parental, and aggressive behavior.

**324 Biopsychology Laboratory (also Psychology 324)** Fall. 3 credits. Limited to 25 upperclass students. Prerequisites: laboratory experience in biology or psychology, Biological Sciences 221 or

Psychology 123, and permission of instructor. S-U grades optional.

Labs, T R 1:25–4:25. T. DeVogd.

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.

**395 Vision (also Applied and Engineering Physics 611)** Fall. 3 credits. Prerequisites:

Chemistry 104 or 208; Mathematics 106, 111, or 113; and either Physics 102 or 208; or permission of instructor. Offered alternate years.

Lecs, M 1:25 and T R 10:10. R. K. Clayton.

A study of the mechanism of seeing that includes biological, physical, and chemical approaches to the subject.

**396 Introduction to Sensory Systems (also Psychology 396)** Spring. 3 or 4 credits (4 credits with discussion and term paper). 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. S-U grades optional for graduate students only.

Lecs, M W F 9:05. B. P. Halpern.  
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 that represent adaptations of animals to particular habitats or environments. The principles and limitations of major methods used to examine sensory systems are considered. General characteristics of sensory systems and auditory, visual, and somesthetic systems are to be covered in spring 1984. One aspect of each system (e.g., localization of objects in space by sound, color vision, and thermoreception) is selected for special emphasis. The course is taught in the Socratic method, in which the instructor asks questions of the students. At the level of *Neurons without Impulses*, edited by Roberts and Bush, and *Recognition of Complex Acoustic Signals*, edited by Bullock.

**420 Seminar in Neurobiology and Behavior** Fall or spring. Variable credit. May be repeated for credit. Primarily for undergraduates. S-U grades optional.

Sem to be arranged. Organizational meetings first W of each semester at 8 p.m. in Caldwell 100. Staff. In most semesters, at least two seminars on different topics are offered. Topics and instructors are listed in the division's catalog supplement issued at the beginning of the semester.

**421 Comparative Vertebrate Ethology** Fall, or 3-week summer session. 3 credits. Prerequisites: one year of introductory biology for majors, Biological Sciences 221, and permission of instructor. S-U grades optional.

Lecs, T R 9:05; lab to be arranged. Independent research project required. W. C. Diller.

A survey of the methods and principles of vertebrate ethology, including such topics as aggression, fear, sex, feeding, and other normal activities. Emphasis is placed on the causation, function, biological significance, and evolution of species-typical behavior. The laboratories are designed to give firsthand knowledge of the material covered in lectures. During the summer, field trips and field projects are substituted for many of the laboratories.

**422 Neuroelectric Systems (also Electrical Engineering 422)** Spring. 3 or 4 credits (4 credits with lab). Prerequisite: Biological Sciences 423 or 496, or Electrical Engineering 301 or 621; written permission of instructor required for lab.

Lecs, M W F 10:10; lab, W or R 1:25–4:20.

R. R. Capranica, B. R. Land.

Application of microprocessors for neuroelectric data acquisition and systems analysis. Lectures cover

electrical activity of single nerve cells, electrodes and instrumentation techniques, analysis of electrophysiological data, and coding principles in the nervous system. Laboratory exercises provide experience in the analysis of biological signals.

**424 Neuroethology** Fall. 3 credits. Prerequisite: Biological Sciences 221. Offered alternate years.

Lecs, T R 10:10–11:30. R. R. Capranica.

The study of the neural basis of ethology. Topics include the physical properties of communication signals, how they guide species-specific behaviors, and how these signals are processed in the nervous system.

**425 Field Studies of Animal Behavior** Fall.

4 credits. Limited to 12 students. Prerequisites: Biological Sciences 221 and written permission of instructor. Recommended: concurrent or previous enrollment in Biological Sciences 421 or 427. S-U grades optional. Fee, \$15.

Lec, T 9:05; lab and disc, R 1:25–4:25; S field trips during the field season; 2 weekend field trips and occasional evening meetings. Enrolled students must participate in all aspects of the course; no partial credit given. P. W. Sherman.

A course for juniors, seniors, and first-year graduate students interested in field research on animal behavior. Lecture-discussion areas include design of field experiments, hypothesis testing, data analysis, and current topics in evolutionary ecology and behavior. Laboratory field sessions acquaint students with observation techniques; research methods; and the behavioral biology of plants, insects, fishes, amphibians, birds, and mammals of upstate New York.

**[427 Vertebrate Social Behavior** Fall. 3 credits.

Prerequisites: Biological Sciences 221, and 260 or 360. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1983–84.

Lecs, M W F 10:10; disc to be arranged.  
S. T. Emlen.

The study of the adaptive bases of social behavior is examined. The first half of the course deals with ecological sociobiology: the effects of ecological constraints of resource dispersion and predation pressures upon the structure of animal societies; the adaptiveness of territoriality and coloniality; the evolution of cooperative and communal social systems; and the functioning of monogamous, polygamous, and promiscuous mating systems. The second half of the course emphasizes genetic sociobiology: the predictions from individual and kin-selection theory for various types of social interactions, e.g., female choice during mate selection; the role of the male in parental care; parent-offspring conflict; behavioral nepotism; and the evolution of phenotypic altruism. Finally, the course examines the impact of the emerging field of sociobiology upon its sister biological and social sciences.]

**[429 Animal Social Behavior** Fall. 3 credits.

Limited to 45 students. May be repeated for credit with permission of instructor. Prerequisite: Biological Sciences 221. S-U grades optional. Not offered 1983–84.

Lecs, T R 10:10–11:30. Staff.

This course examines animal social behavior and social organization in a phylogenetic perspective. A different taxonomic group serves as the focus of the course each year.]

**491 Principles of Neurobiology, Laboratory (also Psychology 491)** Fall. 4 credits. Limited to 24 students. Prerequisite: Biological Sciences 396 or 496, or written permission of instructor.

Labs, M W or T R 12:20–4:25; additional hours to be arranged. B. R. Land.

Laboratory practice with neurobiological preparations and experiments, designed to teach the techniques, experimental designs, and research strategies used to study biophysical and biochemical properties of



excitable membranes, sensory receptors, and the central nervous system transformation of afferent activity, as well as the characteristic composition and metabolism of neural tissue. Theoretical content at the level of Aidley's *The Physiology of Excitable Cells*.

**493 (692) Developmental Neurobiology** Fall 3 credits. Prerequisite: Biological Sciences 496 or 222, or permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years. Lec's, T R 9:05; disc to be arranged. R. B. Campenot.

The embryologic development of the nervous system is considered in the light of both historical and current research. Emphasis is on cellular issues, that is, how do nerve cells differentiate both morphologically and biochemically, and how do they interact to produce a properly wired nervous system?

**495 Molecular Neurobiology** Fall. 3 credits. Prerequisites: Biological Sciences 496 and either 330 or 331. S-U grades optional. Offered alternate years. Lec's, M W 9:05; disc, 2 hours alternate weeks to be arranged. T. R. Podleski.

An examination of molecular aspects of neurobiology. Topics for discussion include voltage-sensitive and chemosensitive gates, biochemical characterization of gates and ion channels, the structure of neurotransmitter receptors and the cloning of DNA specific for these receptors, and molecular aspects of hormonal control of neurons and neural circuits. The ultrastructure of neurons and that of sensory receptors are presented, with an emphasis on identifying the molecular components of these cells and their neuronal activity. In addition, emphasis is placed on the cytoskeletal organization and its interaction with the plasma membrane in regulating neuronal function, as well as interaction between plasma membrane and the extracellular matrix.

**[497 Neurochemistry]** Fall. 3 credits. Limited to 30 students. Prerequisites: Biological Sciences 496 and either 330 or 331, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1983-84.

Lec's and discs, M W F 9:05. R. M. Harris-Warrick. This course focuses primarily on synaptic neurochemistry. The presynaptic regulation and postsynaptic mechanism of action of the major classes of neurotransmitters are discussed, as well as selected neuromodulators and hormones. The relevance of basic mechanisms to normal brain function and neurological disorders are described. Readings are primarily from journal articles.]

**623 Chemical Communication (also Chemistry 622)** Fall. 3 credits. Primarily for research-oriented students. Limited to 30 senior and graduate students. Prerequisites: one year of introductory biology for majors or equivalent, course work in biochemistry, and Chemistry 358 or equivalent. Offered alternate years.

Lec's, 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, neurobiological, ecological, and evolutionary principles.

**[624 Behavioral Neurogenetics]** Spring. 3 credits. Primarily for research-oriented students. Prerequisites: Biological Sciences 221 and 281. Recommended: course work in developmental biology. S-U grades optional. Offered alternate years. Not offered 1983-84.

Lec's, T R 9:05; disc and demonstration to be arranged. R. R. Hoy.

The study of the neurogenetic basis of behavior in animals, using "simple" behaviors that can be analyzed genetically and neurobiologically. Both vertebrate and invertebrate animals are discussed,

although emphasis is on the invertebrates. Lectures and assigned readings draw heavily from journal articles.]

**[627 Quantitative Approaches to Animal Behavior]** Spring. 3 credits. Primarily for graduate students; written permission of instructor required for undergraduates. Enrollment limited. Prerequisite: Biological Sciences 221 or equivalent. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1983-84.

Lec's and discs, T R 10:10-11:30. Staff. This course emphasizes a quantitative approach to research on animal behavior. Lectures, discussions, and readings focus on the formulation of precise, testable hypotheses for behavior research, especially mathematical models, and on the use of systematic sampling techniques in observational research. Basic probability distributions are introduced and used in the analysis of behavior sequences and interaction patterns. Stochastic models of behavior are also discussed.]

**695 Physiological Optics** Fall. 3 credits. Limited to 24 students. Recommended: courses in elementary biology or psychology, and physics, and courses appropriate to particular track (see below). Offered alternate years.

Lec's, T R 9:05; lab, F 1:25-4:25. H. C. Howland. The course is primarily for upperclass students who intend to pursue research or conduct clinical work in vision. Topics include geometrical optics, clinical refraction, measurement of MTF and contrast sensitivity, and the vegetative physiology of the eye relevant to optical quality of the optical image.

Laboratory work is divided into three tracks: (1) *clinical track* for students intending to work in optometry or medicine; (2) *psychophysical track* for students intending to conduct research in human or animal vision; and (3) *engineering track* for students intending to use or design optical devices for which the human eye is a component in the system. Grades are based on the student's accomplishments within the chosen track, in view of the background brought to it.

**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. Suggestions for topics should be submitted by faculty or students to the chairperson of the Section of Neurobiology and Behavior.

## 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)**

**Mammalian Neurophysiology (Biological Sciences 450)**

**Teaching Experience (Biological Sciences 498)**

**Undergraduate Research in Biology (Biological Sciences 499)**

## Courses in Marine Sciences

Although there is no concentration in marine sciences offered to Cornell undergraduates, there is extensive opportunity to prepare for more advanced study at the graduate level. Students interested in the marine sciences may enroll in courses offered at Cornell's Shoals Marine Laboratory (SML), a seasonal field station located on ninety-five-acre Appledore Island, six miles off the Maine and New Hampshire coasts.

The Ithaca campus functions of the Shoals Marine Laboratory are centered in the Cornell Marine Programs Office in 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.

**329 Behavioral Ecology** Summer. 2 credits.

Prerequisite: one year of introductory college biology. Recommended: course work in ecology, evolution, 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 application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$600.

Daily lec's 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.

**363 Field Marine Science for Teachers** Summer.

1 credit. Primarily for teachers, grades 6 through 12, but open to others. 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 application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$450.

Daily lec's, 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. The core faculty of marine biologists is augmented by specialists in science and environmental education.

**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 application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$1,175.

Daily lec's, labs, and fieldwork for 4 weeks. 3 core faculty 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 also is given to introductory physical and chemical oceanography and marine geology. Marine ecology and the effects of human activity on the marine environment are included.

**365 Underwater Research** Summer. 2 credits. Prerequisites: 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 application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, ferry transportation, and compressed air supply), \$710.

Daily lectures and fieldwork for 2 weeks. Team-taught by a diving-safety officer, a faculty member, 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.

**366–370 SEA Semester** In cooperation with the Sea Education Association (SEA), the Cornell Marine Programs 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 basic shore component) in Woods Hole, Massachusetts, 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 R/V *Westward*. Applicants are interviewed in Ithaca before admission. 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 details and application, consult the Cornell Marine Programs Office, G14 Stimson Hall. Program costs to be paid in place of regular Cornell tuition and fees: tuition for entire 17-credit SEA Semester, about \$5,100; room and board for sea component (six weeks only), about \$800.

Instructors for the SEA Semester include faculty of the SEA, the Woods Hole Oceanographic Institution, and others.

#### Shore Component (six weeks)

**366 SEA Introduction to Oceanography** 3 credits. Prerequisites: a laboratory course in physical or biological science, and 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 *Westward* 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.

**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. Considers 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.

#### 368 SEA Introduction to Nautical Science

3 credits. Prerequisites: college algebra or equivalent, and 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 the student employs at sea.

#### Sea Component (six weeks)

Courses 369 and 370 take place aboard the R/V *Westward*, a 250-ton, steel, auxiliary-powered staysail schooner built in 1961. *Westward* normally puts to sea with a ship's company of thirty-four. The professional staff of nine includes the captain, the chief scientist, two 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.

#### 369 SEA Oceanographic Laboratory 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.

#### 370 SEA Oceanographic Laboratory II

4 credits. Prerequisite: Biological Sciences 368. Building on the experience of Oceanographic Laboratory 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.

**413 Adaptations of Marine Organisms** Summer 4 credits. Prerequisite: Biological Sciences 364 or 315 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 application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$925.

Daily lectures, 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 environments of intertidal and shallow subtidal organisms, including determination of temperature, light, salinity, oxygen and nutrient levels, and *in vivo* functional analyses of metabolic phenomena.

#### 441 Field Phycology

Summer. 4 credits. Prerequisite: Biological Sciences 364 or general familiarity with marine algae. 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 application,

consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$910.

Daily lectures, labs, and fieldwork for 3 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.

#### 467 Chemical Oceanography of Coastal Waters

Summer. 4 credits. Prerequisites: one year of introductory college chemistry and an introductory marine science course at the college level. 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 application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$925.

Daily lectures, labs, and fieldwork for 3 weeks.

SML faculty.

A field-oriented course in the chemical oceanography of coastal waters. Lectures, frequent field trips, and laboratory sampling and analysis; includes tests of salinity, temperature, pH, chlorophyll, alkalinity, total CO<sub>2</sub>, nutrients, organic material, and suspended materials in coastal waters, with some work on the analysis of coastal sediments.

#### 473 Topics in Marine Vertebrates

Summer 4 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 application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$925.

Daily lectures, 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.

#### 482 Invertebrate Embryology

Summer 4 credits. Prerequisite: Biological Sciences 364 or a course in invertebrate zoology. 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 application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$910.

Daily lectures, labs, and fieldwork for 3 weeks. SML faculty.

A laboratory-oriented course emphasizing processes of fertilization and early development through the metamorphosis of larvae in species selected from an extensive variety of local marine invertebrates. Practical experience includes collecting specimens intertidally and from the plankton, culturing embryos through metamorphosis, camera lucida and photomicrographic recording of embryonic development, and design and execution of basic experiments on eggs and embryos. Lectures complement laboratory work through phylogenetic examination of classical invertebrate embryology and modern experimental developmental biology.

**Coastal and Oceanic Law and Policy (Natural Resources 306)** Summer. 1 credit. A special 1-week course offered at Cornell's Shoals Marine Laboratory

(SML), on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$315.

Daily lects 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 the 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.

**Geology of Our Coast: Terrestrial and Maritime Aspects (Geological Sciences 201)** Summer 1 credit. 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 application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$340.

Daily lects, 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.

**Introduction to Marine Pollution and Its Control (Agricultural Engineering 420)** Summer. 2 credits. Prerequisite: Biological Sciences 364 or permission of instructor. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$625.

Daily lects, 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 waste water; organic carbon determinations; microbial tests for *Salmonella*, *E. coli*, and *Streptococcus*; and practical field projects.

**Marine Resource Economics (Agricultural Economics 252)** Summer. 1 credit. Prerequisite: an introductory course in economics 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 application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$315.

Daily lects and discs for 1 week. SML faculty. Resource economics in general is concerned with the optimal allocations through time of renewable and nonrenewable resources. This course examines fisheries management, offshore oil and gas recovery, and ocean minerals mining. Models of optimal resource use are developed and used to assess both the behavior of those harvesting marine resources

and the adequacy of current governmental policy. An integral part of the course is the special opportunity to observe and interview those professionally involved in harvesting marine resources in the Gulf of Maine.

**Practical Archaeology under Water: A Basic Introduction (Archaeology 319)** Summer 1 credit. Prerequisite: recognized scuba certification and a medical examination required for students engaging in underwater research. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$340.

Daily lects, 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 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.

**Wetland Resources (Natural Resources 417)** Summer. 1 credit. Prerequisite: one year of college 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 application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$340.

Daily lects, 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. A special program for undergraduate students interested in biophysics is offered as an independent concentration in the biological sciences major (see option 8 under "Concentration Areas and Requirements"). Information on this independent option is available in the Office for Academic Affairs, 118 Stimson Hall. 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)**

**Electron Microscopy for Biologists (Biological Sciences 600, 602, 603, 604, 606, 608)**

**Enzyme Catalysis and Regulation (Chemistry 672)**

**Introduction to Biophysics (Applied and Engineering Physics 206)**

**Membrane Biophysics (Applied and Engineering Physics 615)**

**Membranes and Bioenergetics (Biological Sciences 632)**

**Modern Physical Methods in Macromolecular Characterization (Applied and Engineering Physics 616)**

**Neuroelectric Systems (Biological Sciences 422 and Electrical Engineering 422)**

**Neuroethology (Biological Sciences 424)**

**Photosynthesis (Biological Sciences 445 and Applied and Engineering Physics 601)**

**Physical Chemistry of Proteins (Chemistry 686)**

**Physics of Macromolecules (Physics 464)**

**Principles of Neurobiology, Laboratory (Biological Sciences 491 and Psychology 491)**

**Protein Structure and Function (Biological Sciences 631)**

**Special Topics in Biophysical and Bioorganic Chemistry (Chemistry 782)**

**Special Topics in Biophysics (Applied and Engineering Physics 614)**

**Transport of Solutes and Water in Plants (Biological Sciences 649)**

**Vision (Biological Sciences 395 and Applied and Engineering Physics 611)**

## Faculty Roster

### New York State College of Agriculture and Life Sciences

Adler, Kraig K., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior  
 Barker, Robert, Ph.D., U. of California at Berkeley. Prof., Biochemistry, Molecular and Cell Biology\*  
 Barlow, John P., Ph.D., Harvard U. Assoc. Prof., Ecology and Systematics  
 Bates, David M., Ph.D., U. of California at Los Angeles. Prof., Bailey Hortorium  
 Bedford, Barbara L., Ph.D., U. of Wisconsin at Madison. Asst. Prof., Ecology and Systematics  
 Beyenbach, Klaus W., Ph.D., Washington State U. Asst. Prof., Physiology/Veterinary Physiology†  
 Bruns, Peter J., Ph.D., U. of Illinois. Prof., Genetics and Development\*  
 Brussard, Peter F., Ph.D., Stanford U. Assoc. Prof., Ecology and Systematics\*  
 Cade, Thomas J., Ph.D., U. of California at Los Angeles. Prof., Ecology and Systematics  
 Calvo, Joseph M., Ph.D., Washington State U. Prof., Biochemistry, Molecular and Cell Biology  
 Clayton, Roderick K., Ph.D., California Inst. of Technology. Liberty Hyde Bailey Professor of Plant Biology, Plant Biology/Applied and Engineering Physics†  
 Davies, Peter J., Ph.D., U. of Reading (England). Prof., Plant Biology  
 Edelstein, Stuart J., Ph.D., U. of California at Berkeley. Prof., Biochemistry, Molecular and Cell Biology\*  
 Eisner, Thomas, Ph.D., Harvard U. Jacob Gould Schurman Professor, Neurobiology and Behavior  
 Feeny, Paul P., Ph.D., Oxford U. (England). Prof., Ecology and Systematics/Entomology  
 Fox, Thomas D., Ph.D., Harvard U. Asst. Prof., Genetics and Development  
 Gibson, Jane, Ph.D., U. of London (England). Prof., Biochemistry, Molecular and Cell Biology  
 Goldberg, Michael L., Ph.D., Stanford U. Asst. Prof., Genetics and Development  
 Harris-Warrick, Ronald M., Ph.D., Stanford U. Asst. Prof., Neurobiology and Behavior

Hopkins, Carl D., Ph.D., Rockefeller U. Prof., Neurobiology and Behavior

Ingram, John W., Jr., Ph.D., U. of California at Berkeley. Assoc. Prof., Bailey Hortorium

Jagendorf, Andre T., Ph.D., Yale U. Liberty Hyde Bailey Professor of Plant Biology, Plant Biology

Keller, Elizabeth B., Ph.D., Cornell U. Assoc. Prof., Biochemistry, Molecular and Cell Biology

Lis, John T., Ph.D., Brandeis U. Asst. Prof., Biochemistry, Molecular and Cell Biology

Loew, Ellis R., Ph.D., U. of California at Los Angeles. Assoc. Prof., Physiology/Veterinary Physiology†

McCarty, Richard E., Ph.D., Johns Hopkins U. Prof., Biochemistry, Molecular and Cell Biology\*

McCune, Amy R., Ph.D., Yale U. Asst. Prof., Ecology and Systematics

MacDonald, Russell E., Ph.D., U. of Michigan. Prof., Biochemistry, Molecular and Cell Biology

MacIntyre, Ross J., Ph.D., Johns Hopkins U. Prof., Genetics and Development

Marks, Peter L., Ph.D., Yale U. Assoc. Prof., Ecology and Systematics

Mofat, J. Keith, Ph.D., Cambridge U. (England). Assoc. Prof., Biochemistry, Molecular and Cell Biology

Niklas, Karl J., Ph.D., U. of Illinois. Assoc. Prof., Plant Biology/Ecology and Systematics

Paciullo, Dominick J., Jr., Ph.D., U. of California at Davis. Prof., Plant Biology

Parthasarathy, Mandayam V., Ph.D., Cornell U. Assoc. 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). Asst. Prof., Physiology

Roberts, Jeffrey W., Ph.D., Harvard U. Assoc. Prof., Biochemistry, Molecular and Cell Biology

Root, Richard B., Ph.D., U. of California at Berkeley. Prof., Ecology and Systematics/Entomology

Spanswick, Roger M., Ph.D., U. of Edinburgh (Scotland). Prof., Plant Biology

Srb, Adrian M., Ph.D., Stanford U. Jacob Gould Schurman Professor, Genetics and Development\*

Tye, Bik-Kwoon, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Biochemistry, Molecular and Cell Biology

Uhl, Charles H., Ph.D., Cornell U. Assoc. Prof., Plant Biology

Uhl, Natalie W., Ph.D., Cornell U. Assoc. Prof., Bailey Hortorium

Vogt, Volker M., Ph.D., Harvard U. Asst. Prof., Biochemistry, Molecular and Cell Biology

Walcott, Charles, Ph.D., Cornell U. Prof., Neurobiology and Behavior/Laboratory of Ornithology

Whalen, Michael D., Ph.D., U. of Texas at Austin. Assoc. Prof., Bailey Hortorium/Ecology and Systematics

Young, David A., Ph.D., Claremont Graduate School. Assoc. Prof., Bailey Hortorium

Zahler, Stanley A., Ph.D., U. of Chicago. Prof., Genetics and Development\*

#### Other Teaching Personnel

Alexander, Renee R., Ph.D., Cornell U. Sr. Lecturer, Biochemistry, Molecular and Cell Biology

Calvo, Rita A., Ph.D., Cornell U. Lecturer, Biochemistry, Molecular and Cell Biology

Ecklund, P. Richard, Ph.D., Oregon State U. Lecturer, Neurobiology and Behavior

Ferger, Martha F., Ph.D., Cornell U. Medical College. 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. Lecturer, Ecology and Systematics

Hinkle, Maija V., Ph.D., New York U. Medical School. Lecturer, Biochemistry, Molecular and Cell Biology

McFadden, Carol H., Ph.D., Cornell U. Lecturer, Physiology

Reiss, H. Carol, M.S., Cornell U. Lecturer, Plant Biology

Wilkinson, Maria L., Ph.D., U. of Chile. Lecturer, Biochemistry, Molecular and Cell Biology

#### Joint Appointees

Alexander, Martin, Liberty Hyde Bailey Professor of Soil Science, Agronomy/Ecology and Systematics

Bloom, Stephen E., Assoc. Prof., Poultry and Avian Sciences/Biological Sciences

Borror, Arthur C., Adjunct Prof., U. of New Hampshire/Biological Sciences

Brown, William L., Jr., Prof., Entomology/Ecology and Systematics

Butler, Walter R., Asst. Prof., Animal Science/Physiology

Currie, W. Bruce, Assoc. Prof., Animal Science/Physiology

Delwiche, Eugene A., Prof., Microbiology/Biological Sciences

Foote, Robert H., Jacob Gould Schurman Professor, Animal Science/Physiology

Korf, Richard P., Prof., Plant Pathology/Bailey Hortorium

LaRue, Thomas A., Adjunct Prof., Boyce Thompson Institute/Plant Biology

Leopold, A. Carl, Adjunct Prof., Boyce Thompson Institute/Plant Biology

Novak, Joseph D., Prof., Education/Biological Sciences

Pimentel, David, Prof., Entomology/Ecology and Systematics

Richmond, Milo E., Assoc. Prof., USDI Fish and Wildlife Service/Natural Resources/Ecology and Systematics

Szalay, Aladar A., Adjunct Asst. Prof., Boyce Thompson Institute/Biological Sciences

Thompson, John F., Adjunct Prof., USDA Science and Education Administration/Plant Biology

VanDemark, Paul J., Prof., Microbiology/Biological Sciences

van Tienhoven, Ari, Prof., Poultry and Avian Sciences/Physiology

Wheeler, Quentin D., Asst. Prof., Entomology/Bailey Hortorium

#### College of Arts and Sciences

Blackler, Antonie W., Ph.D., U. of London (England). Prof., Genetics and Development

Bretscher, Anthony P., Ph.D., Leeds U. (England). Asst. Prof., Biochemistry, Molecular and Cell Biology

Campenot, Robert B., Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Neurobiology and Behavior

Capranica, Robert R., Sc.D., Massachusetts Inst. of Technology. Prof., Neurobiology and Behavior/Electrical Engineering†

Chabot, Brian F., Ph.D., Duke U. Assoc. Prof., Ecology and Systematics

Dilger, William C., Ph.D., Cornell U. Assoc. Prof., Neurobiology and Behavior

Emlen, Stephen T., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior

Feigenson, Gerald W., Ph.D., California Inst. of Technology. Assoc. Prof., Biochemistry, Molecular and Cell Biology

Fessenden-Raden, June M., Ph.D., Tufts U. Assoc. Prof., Biochemistry, Molecular and Cell Biology/Program on Science, Technology, and Society

Fortune, Joanne E., Ph.D., Cornell U. Asst. Prof., Physiology/Women's Studies†

Gibson, Quentin H., Ph.D./D.Sc., Queen's U. (Northern Ireland). Greater Philadelphia Professor in Biological Sciences, Biochemistry, Molecular and Cell Biology

Hall, Charles A. S., Ph.D., U. of North Carolina at Chapel Hill. Asst. Prof., Ecology and Systematics

Halpern, Bruce P., Ph.D., Brown U. Prof., Neurobiology and Behavior/Psychology

Heppel, Leon A., Ph.D., U. of California at Berkeley. Prof., 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

Howland, Howard C., Ph.D., Cornell U. Assoc. Prof., Neurobiology and Behavior/Physiology

Hoy, Ronald R., Ph.D., Stanford U. Assoc. Prof., Neurobiology and Behavior

Kennedy, Kenneth A. R., Ph.D., U. of California at Berkeley. Prof., Ecology and Systematics

Land, Bruce R., Ph.D., Cornell U. Asst. Prof., Neurobiology and Behavior/Electrical Engineering†

Levin, Simon A., Ph.D., U. of Maryland at College Park. Prof., Ecology and Systematics†

McFarland, William N., Ph.D., U. of California at Los Angeles. Prof., Ecology and Systematics/Physiology†

Podleski, Thomas R., Ph.D., Columbia U. Prof., Neurobiology and Behavior†

Rabinowitz, Deborah, Ph.D., U. of Chicago. Assoc. Prof., Ecology and Systematics

Racker, Efraim, M.D., U. of Vienna (Austria). Albert Einstein Professor of Biochemistry, Biochemistry, Molecular and Cell Biology

Risch, Stephen J., Ph.D., U. of Michigan. Asst. Prof., Ecology and Systematics/Program on Science, Technology, and Society

Salpeter, Miriam M., Ph.D., Cornell U. Prof., Neurobiology and Behavior/Applied and Engineering Physics†

Sherman, Paul W., Ph.D., U. of Michigan. Asst. Prof., Neurobiology and Behavior

Turgeon, E. Robert, Ph.D., Carleton U. (Canada). Asst. Prof., Plant Biology

Wilson, David B., Ph.D., Stanford U. Assoc. Prof., Biochemistry, Molecular and Cell Biology

Wimsatt, William A., Ph.D., Cornell U. Prof., Genetics and Development/Physiology

Wolfner, Mariana F., Ph.D., Stanford U. Asst. Prof., Genetics and Development

Wu, Ray, Ph.D., U. of Pennsylvania. Prof., Biochemistry, Molecular and Cell Biology

#### Other Teaching Personnel

Eberhard, Carolyn, Ph.D., Boston U. Sr. Lecturer, Plant Biology

Schaffner, William R., Ph.D., Cornell U. Lecturer, Ecology and Systematics

#### Joint Appointees

Hammes, Gordon G., Horace White Professor of Chemistry and Biochemistry, Chemistry/Biochemistry, Molecular and Cell Biology

Likens, Gene E., Adjunct Prof., New York Botanical Garden Cary Arboretum/Ecology and Systematics

Provine, William B., Assoc. Prof., History/Ecology and Systematics

Regan, Elizabeth Atkins, Assoc. Prof., Psychology/Neurobiology and Behavior

Rhee, G-Yull, Adjunct Assoc. Prof., New York State Department of Health/Ecology and Systematics

#### New York State College of Veterinary Medicine

Corradino, Robert A., Ph.D., Cornell U. Assoc. Prof., Physiology/Veterinary Physiology

Gasteiger, Edgar L., Ph.D., U. of Minnesota. Prof., Physiology/Veterinary Physiology

Hansel, William, Ph.D., Cornell U. Liberty Hyde Bailey Professor of Animal Physiology, Physiology/Veterinary Physiology/Animal Science\*†

Lengemann, Frederick W., Ph.D., U. of Wisconsin at Madison. Prof., Physiology/Veterinary Physiology

Tapper, Daniel N., Ph.D., Cornell U. Prof., Physiology/Neurobiology and Behavior/Veterinary Physiology

Wasserman, Robert H., Ph.D., Cornell U. Prof., Physiology/Veterinary Physiology/Nutritional Sciences

#### Joint Appointees

Bergman, Emmett N., Prof., Veterinary Physiology/Physiology

Dobson, Alan, Prof., Veterinary Physiology/Physiology

Evans, Howard E., Prof., Anatomy/Biological Sciences

Gillespie, James H., Prof., Microbiology/Biological Sciences  
 Houpt, Katherine A., Asst. Prof., Veterinary Physiology/Physiology  
 Houpt, T. Richard, Prof., Veterinary Physiology/Physiology  
 Sharp, Geoffrey W. G., Prof., Pharmacology/Physiology

## College of Engineering

### Joint Appointee

Cisne, John L., Asst. Prof., Geological Sciences/Biological Sciences

## Division of Biological Sciences

Stinson, Harry T., Jr., Ph D., Indiana U. Prof., Biological Sciences

## 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., Asst. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology  
 Watford, Malcolm, Asst. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology  
 Zilversmit, Donald B., Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology

\*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.



## Graduate School of Business and Public Administration

### Administration

David A. Thomas, dean

Robert H. Smiley, associate dean for academic affairs  
James W. Schmotter, assistant dean for admissions and student affairs

Albert E. Brill, assistant dean for placement

JoAnne F. Kloppenburg, director of financial aid and registrar

Ann L. Calkins, assistant dean for external affairs

Harriet A. Peters, assistant director of placement

Caroline Violette, director of student activities and special projects

The Graduate School of Business and Public Administration prepares men and women for managerial careers in private business, public service, and health care. The school offers course work in many disciplines to provide potential business, public, and health 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.), Master of Public Administration (M.P.A.), or Master of Professional Studies (Hospital and Health Services Administration) [M.P.S. (H.H.S.A.)]. Students may also earn an M.B.A. with a concentration in public or health administration. Nearly half of the students have a background of undergraduate studies in arts and sciences, and about one-quarter in engineering. One-quarter of the students begin their graduate training immediately after receiving their bachelor's degrees and the remaining three-quarters following work experience.

Combined degree programs allow highly qualified Cornell students to 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 and comprehensive education in administration, primarily for those who seek careers in teaching and research.

More-detailed information about these programs is available in the *Announcement of the Graduate School of Business and Public Administration*, obtainable from the Assistant Dean for Admissions and Student Affairs, Graduate School of Business and Public Administration, Malott Hall.

### Undergraduate Only

**NBA 300 Entrepreneurship and Small Business Management** 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/or 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, venture capital sources, as well as planning techniques necessary to a successful venture.

### NCC Common Core Courses

**NCC 500 Financial Accounting**

**NCC 501 Quantitative Methods for Management**

**NCC 502 Economic Principles for Management**

**NCC 503 Introduction to Computer Programming**

**NCC 504 Introduction to Management Information Systems**

### NBP Business Administration Program Core Courses

**NBP 500 Marketing Management**

**NBP 501 Production and Operations Management**

**NBP 502 Managerial Finance**

**NBP 503 Business Policy**

**NBP 504 Introduction to the Business-Government Interface**

### NBA Business Administration Elective Courses

**NBA 500 Intermediate Accounting**

**NBA 501 Advanced Accounting**

**NBA 502 Managerial Cost Accounting**

**NBA 504 Introduction to Taxation Affecting Business and Personal Decision Making**

**NBA 505 Auditing**

**NBA 506 Financial Information Evaluation**

**NBA 507 Federal Income Tax**

**NBA 510 Law of Business Associations**

**NBA 511 Advanced Business Law**

**NBA 514 Financial Policy Decisions**

**NBA 515 Economic Evaluation of Capital Investment Projects**

**NBA 516 Investment Management**

**NBA 517 Security Analysis**

**NBA 518 Financial Markets and Institutions**

**NBA 521 Finance Theory**

**NBA 524 Options, Bonds, and Commodities**

**NBA 525 Investment Banking**

**NBA 541 Marketing Research**

**NBA 543 Marketing Strategy**

**NBA 546 Marketing Decision Analysis**

**NBA 548 Marketing Management of Industrial Products**

**NBA 551 Consumer Behavior**

**NBA 552 Special Topics in Marketing Management**

**NBA 554 Advertising Practicum**

**NBA 559 Research Seminar in Operations Management**

**NBA 562 Business Logistics Management**

**NBA 563 Policy Issues for the 80s**

**NBA 564 Entrepreneur and Small Business**

### NPP Public Administration Core Courses

**NPP 500 Economic Foundations of Public Policy**

**NPP 501 Public Financial Management**

**NPP 502 Industrial Policy—Lessons for the U.S. from Japan and Europe**

**NPP 503 The Conduct of Public Affairs**

### NPA Public Administration Elective Courses

**NPA 500 Management of Urban Issues**

**NPA 512 Seminar in Public Systems Analysis**

**NPA 515 The Politics of Technical Decisions I**

**NPA 516 The Politics of Technical Decisions II**

**NPA 518 Public Affairs Colloquium**

**NPA 520 Legal Process**

### NHP Hospital and Health Services Administration Core Course

**NHP 500 Introduction to Health Services**

### NHA Hospital and Health Services Administration Elective Courses

**NHA 501 Hospital Strategic Planning**

**NHA 502 Psychiatric Institutions: Administration and Practice**

**NHA 503 Primary Health Care Services: Policy and Planning**

**NHA 504 Legal Aspects of Hospital Administration**

**NHA 505 Health Services Research and Evaluation**

**NHA 506 Health Economics**

**NHA 507 Health and Welfare Policy**

**NHA 508 HMO Development and Management**

- NHA 509** Health Operations Management and Planning
- NHA 510** Seminar in Hospital Management
- NHA 511** Field Studies in Health Administration and Planning
- NHA 513** Long-Term Care Services: Policy and Planning
- NHA 514** Washington Health Policy Field Seminar
- NHA 515** Orientation to Tertiary Hospital Services
- NHA 516** Selected Topics in the Administration of Teaching Hospitals
- NHA 517** Introduction to Clinical Medicine: The Physician, the Hospital, and the Delivery of Medical Care
- NHA 518** Financial Management of Hospitals
- NHA 519** International Comparisons of Health Services and Socioeconomic Development
- NHA 520** Labor Relations in the Health Industry
- NHA 521** State Government Health Policy Seminar

## NCE Common Course Electives

- NCE 500** Fund Accounting
- NCE 504** Political Economy in National and International Perspectives
- NCE 505** International Trade and Finance
- NCE 506** Politics and Development in the Arabian Gulf
- NCE 507** American Business Operations Abroad
- NCE 508** International and Competitive Management
- NCE 509** International Business Environment: Southeast Asia
- NCE 514** Administration of Agricultural and Rural Development
- NCE 523** Macroeconomic Theory and Policy
- NCE 527** American Industry: Economic Analysis and Public Policy
- NCE 528** Topics in Managerial Economics
- NCE 540** Organizational Theory and Behavior
- NCE 541** Personnel Administration and Human Relations
- NCE 542** Processes and Techniques in Organizational Development
- NCE 544** Applied Organizational Theory
- NCE 545** Stress in Organizations
- NCE 547** Negotiations
- NCE 548** Power and Influence
- NCE 551** Behavioral Decision Theory
- NCE 565** Applied Econometrics
- NCE 566** Management Science
- NCE 569** Introduction to COBOL
- NCE 570** Data-Base Management
- NCE 571** Computer Systems Analysis
- NCE 580** Seminar in University Administration
- NCE 581** Management Writing
- NCE 582** Oral Communications

## NMI and NRE Research

- NMI 500-502** Directed Readings and Research
- NRE 502** Seminar in Current Research in Marketing
- NRE 503** Advanced Capital Market Theory
- NRE 504** Accounting Workshop
- NRE 505** Finance Workshop
- NRE 942** Social Psychology of Organizing

## Faculty Roster

- Abolafia, Mitchell, Ph.D., SUNY at Stony Brook. Asst. Prof., Organizational Behavior
- Ahlers, David M., Ph.D., Carnegie-Mellon U. Assoc. Prof., Management
- Battistella, Roger M., Ph.D., U. of Michigan. Prof., Medical Care Organization
- Begun, James W., Ph.D., U. of North Carolina. Assoc. Prof., Health Care Administration
- Bent, Frederick T., Ph.D., U. of Chicago. Assoc. Prof., Public Administration
- Bierman, Harold, Jr., Ph.D., U. of Michigan. Nicholas H. Noyes Professor of Business Administration, Business Administration
- Brooks, Earl, M.S., American U. Prof., Administration
- Bugliari, Joseph B., J.D., Cornell U. Prof., Agricultural and Business Law
- Chan, Louis, Ph.D., Rochester U. Asst. Prof., Finance
- Dyckman, Thomas R., Ph.D., U. of Michigan. Ann Whitney Olin Professor of Accounting, Accounting
- Eastaugh, Steven R., Sc.D., Johns Hopkins U. Asst. Prof., Health Economics and Hospital Finance
- Elliott, John A., Ph.D., Cornell U. Asst. Prof., Accounting
- Flash, Edward S., Jr., Ph.D., Cornell U. Assoc. Prof., Public Administration
- Hass, Jerome E., Ph.D., Carnegie-Mellon U. Prof., Managerial Economics and Finance
- Hilton, Ronald W., Ph.D., Ohio State U. Assoc. Prof., Accounting
- Jarrow, Robert A., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Finance
- Krackhardt, David, Ph.D., U. of California-Irvine. Asst. Prof., Organizational Behavior
- Lind, Robert C., Ph.D., Stanford U. Prof., Economics and Public Administration
- McAdams, Alan K., Ph.D., Stanford U. Assoc. Prof., Managerial Economics
- McClain, John O., Ph.D., Yale U. Prof., Quantitative Analysis
- Morse, Dale, Ph.D., Stanford U. Asst. Prof., Accounting
- O'Hara, Maureen, Ph.D., Northwestern U. Asst. Prof., Finance
- Oldfield, George S., Ph.D., U. of Pennsylvania. Assoc. Prof., Economics and Finance
- Orman, Levent, Ph.D., Northwestern U. Asst. Prof., Computer Management
- Rao, Vithala R., Ph.D., U. of Pennsylvania. Emerson Electric Company Professor of Marketing, Marketing/Quantitative Analysis
- Sabavala, Darius J., Ph.D., Columbia U. Assoc. Prof., Marketing and Management Science
- Smidt, Seymour, Ph.D., U. of Chicago. Nicholas H. Noyes Professor of Economics and Finance, Managerial Economics
- Smiley, Robert H., Ph.D., Stanford U. Assoc. Prof., Economics and Public Policy
- Swieringa, Robert J., Ph.D., U. of Illinois. Prof., Accounting
- Thaler, Richard H., Ph.D., U. of Rochester. Assoc. Prof., Economics and Public Administration
- Thomas, David A., Ph.D., U. of Michigan. Prof., Accounting
- Thomas, L. Joseph, Ph.D., Yale U. Prof., Production and Quantitative Analysis
- Weick, Karl E., Ph.D., Ohio State U. Nicholas H. Noyes Professor of Organizational Behavior, Psychology and Organizational Behavior
- Weiss, Elliott N., Ph.D., U. of Pennsylvania. Asst. Prof., Operations Management
- Wittink, Dick R., Ph.D., Purdue U. Assoc. Prof., Marketing and Quantitative Methods

## Lecturer

- Rosen, Charlotte, Ph.D., Cornell U. Lec., Management Communication

## Adjunct and Visiting Faculty

- Abelow, William J., J.D., Columbia U. Visiting Assoc. Prof., Labor Relations in the Health Industry
- Brown, Douglas R., Ph.D., Syracuse U. Coordinator, Health Services Development and Continuing Education
- Crane, Robert M., M.B.A., Cornell U. Visiting Prof., Health Policy
- Dotson, Arch T., Ph.D., Harvard U. Prof., Government
- Esman, Milton J., Ph.D., Princeton U. John S. Knight Professor of International Studies
- Hamilton, Robert, Ph.D., U. of Southern California. Visiting Asst. Prof., Accounting
- Kern, John E., M.P.A., Cornell U. Visiting Prof., Health Policy and Planning
- LaCosta, Cosmo J., M.P.A., New York U. Visiting Prof., Hospital Administration
- Ley, Allyn B., M.D., Columbia U. Visiting Prof., Administrative Medicine
- Maynes, E. Scott, Ph.D., U. of Michigan. Visiting Prof., Consumer Economics and Marketing
- Thompson, David D., M.D., Cornell U. Visiting Prof., Hospital Administration
- Yanni, Frederick, M.P.A., Cornell U. Visiting Prof., H.M.O. Development and Management

## College of Engineering

### Administration

Thomas E. Everhart, dean  
 Donald F. Berth, associate dean  
 Richard H. Lance, associate dean  
 William B. Streett, associate dean  
 Ron W. Simmons, assistant dean  
 Gilbert F. Rankin, director of administrative operations and facilities  
 Robert E. Gardner, director of admissions  
 Mariea T. Blackburn, associate director of admissions  
 Robert L. Smith, assistant director of admissions  
 Gladys J. McConkey, director of engineering publications  
 Jane H. Pirko, registrar  
 Etaoin Shrdlu

### Facilities

Most of the academic units of the College of Engineering are centered in the ten modern buildings located 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.

Special facilities used in engineering include the following:

**Computer-Aided Design Instructional Facility (CADIF).** A new laboratory providing state-of-the-art computer-graphics technology for engineering course work.

**Cornell Computing Facility.** Several IBM mainframe computers running VM/SP CMS, a DECSYSTEM 2060, a VAX 11/750, microprocessors, microcomputers, and graphics facilities.

**Cornell High Energy Synchrotron Source.** A synchrotron radiation laboratory operated in conjunction with the University's high-energy storage ring.

**Laboratory of Plasma Studies.** A center for interdisciplinary research in plasma physics and lasers.

**Materials Science Center.** Operates central laboratories with sophisticated equipment and supports interdisciplinary research.

**National Astronomy and Ionosphere Center (Arecibo).** The world's largest radio-radar telescope facility, operated by Cornell University in Arecibo, Puerto Rico.

**National Research and Resource Facility for Submicron Structures.** Provides equipment and services for research in microstructure science, engineering, and technology.

**Ward Laboratory of Nuclear Engineering.** Irradiation, isotope production, and activation analysis facilities for interdisciplinary research.

### 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.

Graduate programs, which are administered by the Graduate School, are described in the *Announcement of the Graduate School* and the

special *Announcement Graduate Study in Engineering and Applied Science*. Two programs that are closely related to undergraduate study in the College of Engineering—the Master of Engineering degree program and a special master's degree program that combines studies in engineering and in business administration—are described below.

### The Master of Engineering Degree Program

One-year Master of Engineering (M.Eng.) programs are offered in eleven 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 eleven M.Eng. degrees and the academic areas under which they are described are listed below.

**M.Eng.(Aerospace):** Mechanical and aerospace engineering

**M.Eng.(Agricultural):** Agricultural engineering

**M.Eng.(Chemical):** Chemical engineering

**M.Eng.(Civil):** Civil and environmental engineering

**M.Eng.(Computer Science):** Computer science

**M.Eng.(Electrical):** Electrical engineering

**M.Eng.(Engineering Physics):** Applied and engineering physics

**M.Eng.(OR&IE):** Operations research and industrial engineering

**M.Eng.(Materials):** Materials science and engineering

**M.Eng.(Mechanical):** Mechanical and aerospace engineering

**M.Eng.(Nuclear):** Nuclear science and engineering

Cornell engineering graduates in the upper half of their class will generally be admitted to the program; however, requirements for admission vary by field. Other applicants must have a baccalaureate degree from an engineering program accredited by the Accreditation Board for Engineering and Technology or its equivalent, 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. Application forms and further information are available from the Office of the Graduate Professional Programs Committee, Hollister Hall.

### Cooperative Program with the Graduate School of Business and Public Administration

A dual program culminating in both Master of Engineering and Master of Business Administration degrees is available for students with suitable undergraduate background. The curriculum generally requires two years of study beyond the baccalaureate, rather than the three years such a program would normally require; with appropriate choice of undergraduate courses, it is possible to earn the Bachelor of Science, the Master of Engineering, and the Master of Business Administration degrees in six years.

Students interested in this special program should plan their undergraduate curricula with this in mind. Advice and information should be sought from the undergraduate engineering department in which the student is taking an upperclass field program.

Information about admission to the graduate program and about special scholarship aid that is available may be obtained from the Graduate Professional Programs Committee, Hollister Hall.

### Undergraduate Study

Bachelor of science (B.S.) degrees are offered in the following areas:

Agricultural engineering\*  
 Chemical engineering  
 Civil and environmental engineering  
 College Program  
 Computer science  
 Electrical engineering  
 Engineering physics  
 Geological sciences  
 Materials science and engineering  
 Mechanical engineering  
 Operations research and industrial engineering

Students in the College of Engineering begin their undergraduate studies in the Common Curriculum, adopted in 1981† and administered by the faculty members of the Common Curriculum Governing Board (CCGB) through the Office of Undergraduate Affairs. 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.

A student 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 Affairs, 167 Olin Hall.

### 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, as well as 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	15
2) Physics	12
3) Chemistry	4
4) Freshman Seminar	6
5) Computer programming (plus one approved course in computing applications)	4
6) Engineering distribution (4 courses)	12
7) Humanities and social sciences (6 courses)	18
8) Electives:	
Approved electives	9
Free electives	6
Technical electives	6

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 128 and 140. Two terms of

\*To major in agricultural engineering students enroll in the College of Agriculture and Life Sciences for the first and second years, and jointly in that college and the College of Engineering for the third and fourth years.

†Students in the class of 1984 and earlier should refer to the University *Announcement Courses of Study 1982-83* for a description of degree requirements.

physical education must be taken in the freshman year to satisfy a University requirement.

### Mathematics

The normal program in mathematics includes Mathematics 191 or 193, 192, 293, and 294. Students who have little or no acquaintance with the calculus take Mathematics 191. Students with some knowledge of the calculus, but not enough for advanced placement, take Mathematics 193.

### Physics

The normal program in physics includes Physics 112, 213, and 214. Students in the Field Program in Civil and Environmental Engineering may substitute Chemistry 208 for Physics 214.

### Chemistry

Chemistry 207 is required for all students and is normally taken in the first freshman semester.

### Freshman Seminars

Each semester of their freshman year, students choose a Freshman Seminar from among more than seventy courses offered by over twenty different departments in the humanities, social sciences, and expressive arts. These courses all offer the student practice in writing English prose. They also assure beginning students the benefits of a small class.

### Computing

In either the first or second term of their freshman year, students take Engr 105, Introduction to Computer Programming. Before graduation, they must take an additional course with a significant amount of computing applications. Courses that satisfy this requirement are Engr 211, Engr 321, CEE 301, EE 424, M&AE 489, M&AE 670, and M&AE 575.

### Engineering Distribution

Four engineering distribution courses (12 credits) are required. These courses must be selected from four of the seven areas listed below. A student may use only one of the possible substitutions described.

#### 1) Scientific computing

Engr 211, Computers and Programming  
Engr 321, Numerical Methods

Students in the Field Program in Civil and Environmental Engineering may substitute CEE 301 for Engr 321.

#### 2) Materials science

Engr 261, Introduction to Mechanical Properties of Materials  
Engr 262, Introduction to Electrical Properties of Materials

#### 3) Mechanics

Engr 202, Mechanics of Solids  
Engr 203, Dynamics

Students in the Field Program in Engineering Physics may substitute A&EP 333 for Engr 203.

#### 4) Probability and statistics

Engr 260, Introduction to Engineering Probability  
Engr 270, Basic Engineering Probability and Statistics

Students in the Field Program in Electrical Engineering may substitute EE 310 for Engr 260. Students in the Field Program in Applied and Engineering Physics may substitute EE 310 or Mathematics 471 for Engr 260.

#### 5) Electrical sciences

Engr 210, Introduction to Electrical Systems  
A&EP 264, Computerized Instrumentation Design

#### 6) Thermodynamics and energy balances

Engr 219, Mass and Energy Balances

Engr 221, Thermodynamics

#### 7) Introduction to engineering

Several courses are offered to introduce freshmen to the various fields of engineering. Some of these

courses, which are numbered consecutively beginning with Engr 110, may not be included in this Announcement. A full listing will be available at the time of registration.

### Humanities and Social Sciences

The six required courses in the humanities and social sciences must be chosen from approved courses in three categories: (a) humanities or history, (b) social sciences, and (c) expressive or language arts.

The contents of these categories are listed below. At least three courses must be chosen from category (a), and no more than one course may be chosen from category (c).

#### a) Humanities or History

This category includes all courses designated by the College of Arts and Sciences as fulfilling its distribution requirements in humanities and history (see pp. 95-96) as well as the following:

History of Art: all courses numbered 200 and above;  
Music: all introductory courses (except 122) and all theory and history courses;  
Theater Arts: all history, literature, and theory courses, and all cinema courses except 377 and 477.

#### b) Social Sciences

This category includes all courses designated by the College of Arts and Sciences as fulfilling its distribution requirements in social sciences (see p. 95) as well as the following:

*College of Agriculture and Life Sciences:* Agricultural Economics 150, 250, 332; Communication Arts 200, 215, 302, 303, 404; Education 110, 271, 317; Natural Resources 201, 407; Rural Sociology, all courses.

#### *College of Architecture, Art, and Planning:*

Architecture 181, 182, 544; City and Regional Planning 340, 400, 402, 403, 404, 413, 414.

*College of Arts and Sciences:* Economics, all courses except 317, 318, 319, 320.

*College of Engineering:* Civil and Environmental Engineering 321, 322, 325; Computer Science 305; Mechanical and Aerospace Engineering 302.

*School of Hotel Administration:* 111, 281, 282.

*College of Human Ecology:* Consumer Economics and Housing 110, 111, 148, 247, 355; Human Development and Family Studies, all courses except 141, 242, 243, 348; Human Service Studies, all courses.

*School of Industrial and Labor Relations:* all courses except those in economic and social statistics.

*Division of Nutritional Sciences:* 115.

#### c) Expressive or Language Arts

This category includes all courses designated by the College of Arts and Sciences as fulfilling its distribution requirements in expressive arts (see p. 96) as well as the following:

*College of Agriculture and Life Sciences:* Communication Arts, all courses; Floriculture 111.

*College of Architecture, Art, and Planning:* Art, all courses.

*College of Arts and Sciences:* All language courses.

*College of Human Ecology:* Design and Environmental Analysis 101, 111, 115.

### 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, nontrivial program. Free electives 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.

## The Office of Undergraduate Affairs

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 Office of Undergraduate Affairs, which implements the academic policies of the Common Curriculum Governing Board. Regular students may affiliate with a field after one full year of study, and must do so no later than the end of the second full year of study; transfer students must affiliate with a field of study when they matriculate.

Engineering courses taken at the freshman and sophomore levels are listed under Engineering Common Courses.

Following is a typical curriculum for freshmen. Many variations are possible, depending on the individual student's background, advanced placement credit, and career goals. Those acquainted with the calculus may take Physics 112 in term one. Students who intend to enter the Field Program in Chemical Engineering should take Chemistry 208 in term two as an approved elective. Students with an interest in bioengineering may take biology in terms one and two as approved electives.

Term 1	Credits
Math 191 or 193, Calculus for Engineers	4
Chem 207, General Chemistry	4
Engr 105, Introduction to Computer Programming; or Phys 112, Mechanics and Heat	4
Introduction to Engineering, or an approved elective	3
Freshman Seminar	3
Term 2	
Math 192, Calculus for Engineers	4
Phys 112, Mechanics and Heat; or Phys 213, Electricity and Magnetism	4
Approved elective or Engr 105, Introduction to Computer Programming	3 or 4
Engineering distribution course, humanities and social sciences course, or approved elective	3 or 4
Freshman Seminar	3

## 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 may choose to enroll in a field program at the beginning, middle, or end of their sophomore year. Some fields require a specific engineering distribution course as a prerequisite for the upperclass course sequence. These requirements are:

Chemical Engineering: Engr 219  
Civil and Environmental Engineering: Engr 202  
Computer Science: Engr 211  
Electrical Engineering: Engr 210  
Engineering Physics: Engr 221  
Materials Science and Engineering: Engr 261  
Mechanical and Aerospace Engineering: Engr 202  
Operations Research and Industrial Engineering: Engr 260

## College Program

Individually arranged courses of study under the College Program are possible for those 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 may receive 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.

Every curriculum in the College Program, with the exception of certain faculty-sponsored programs, must comprise an engineering major and a 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 fourteen courses in the major and minor subjects, including at least seven engineering courses, each program includes humanities and social sciences electives and free electives.

Further information about the College Program may be obtained from the Office of Undergraduate Affairs, 167 Olin Hall.

### Dual Degree Option

A special academic option, intended for superior students, is the dual degree program, in which both Bachelor of Science and Bachelor of Arts degrees can be earned in five years. Students registered in either 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 Office of Undergraduate Affairs, 167 Olin Hall.

### Engineering Cooperative Program

A special program for undergraduates in most fields of engineering is the Engineering Cooperative Program, which provides an opportunity to supplement course work with carefully monitored, paid jobs in industry and other engineering-related enterprises. Sophomores in the upper half of their class are eligible to apply for the program; students from foreign countries must have visas that allow them to work in the United States.

Prospective co-op students 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 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 classmates.

Further information may be obtained from the Engineering Cooperative Program office, 105 Hollister Hall.

### Advanced Placement Credit

A growing number of freshmen entering the College of Engineering are eligible to receive advanced placement (AP) credit toward degree requirements, in recognition of demonstrated academic proficiency. 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. Two ways in which freshmen may use such credit are detailed below.

- 1) AP credit can be used to fulfill basic requirements, thus permitting advanced study in the same

subject area or enrollment in additional nontechnical elective courses.

- 2) In a few cases, students may receive enough AP credit to complete the B.S. degree requirements ahead of time.

The college's policies concerning placement credit and its use in developing undergraduate programs are fully described in the publication *Advanced Placement for Engineers*, which may be obtained at the Office of Undergraduate Affairs, 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.

College courses completed under the auspices of cooperative college-high school programs may be considered for an exception to these general policies concerning advanced standing. Credit for such courses is not automatically given, however; students must be prepared to demonstrate academic proficiency by taking the appropriate CEEB or Cornell departmental placement examination, as described above.

### Academic Standing

The requirements for good standing in the college vary slightly among the different divisions. Freshmen must have a grade-point average of 1.7 or higher with no failing, unsatisfactory, or incomplete grades and must be making adequate progress toward the four-year degree. Sophomore requirements are the same, except that the grade-point average must be at least 2.0. Upperclass requirements depend upon the field of study.

Dean's List citations are presented each semester to those engineering students with exemplary academic records. The criteria for this honor are determined by the dean of the college. In 1982-83 a term average of 3.25 or higher was required, with no failing, unsatisfactory, or incomplete grades, and 12 credits or more of letter grades.

## Agricultural Engineering

N. R. Scott, chairman; L. D. Albright, J. A. Bartsch, J. R. Cooke, D. S. Durnford, R. B. Furry, K. G. Gebremedhin, W. W. Gunkel, D. A. Haith, L. H. Irwin, W. J. Jewell, G. Levine, R. C. Loehr, H. A. Longhouse, D. C. Ludington, W. F. Millier, R. E. Pitt, G. E. Rehkgugler, T. S. Steenhuis, L. P. Walker, M. F. Walter

### Bachelor of Science Curriculum

Students in the Field Program in Agricultural Engineering are usually enrolled in the College of Agriculture and Life Sciences during the freshman and sophomore years, and jointly enrolled in that college and the College of Engineering in the junior and senior years (paying the engineering college tuition in the junior year). The curriculum is outlined below.

Basic Subjects	Credits
Math 191, 192, 293, 294, Calculus and Engineering Mathematics	15
Chem 207, General Chemistry	4
Phys 112, 213, 214, Physics I, II, and III	12
Introductory biological sciences	6 to 8
Ag En 151, 152, Computer Programming and Graphics	4
Engineering distribution (four courses, including Mechanics of Solids, Thermodynamics, Computers and Programming)	12

Humanities and social sciences (eight courses, including two in written expression, one in oral expression, and a minimum of 9 credits in humanities) 24

### Advanced and Applied Subjects

Engineering sciences (must include Fluid Mechanics and Dynamics), Ag En 250, and four agricultural engineering courses above Ag En 450 (for a minimum of 12 credits), excluding seminar or special-problems courses	33
Biological or agricultural sciences	12
Free electives	6

Total credits 128 to 130

### Master of Engineering (Agricultural) Degree Program

The program for the M.Eng.(Agricultural) degree is intended primarily for those students who plan to enter engineering practice rather than for those who expect to study for the doctorate. The curriculum is planned as an extension of the Cornell undergraduate program in agricultural engineering but can accommodate graduates of other engineering programs. 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 professional-level report.

A candidate for the M.Eng.(Agricultural) degree may choose to concentrate in one of the subareas of agricultural engineering or take a broad program without specialization. The subareas are (a) power and machinery, (b) soils and water engineering, (c) agricultural structures and associated systems, (d) electric power and processing, (e) energy management, (f) agricultural waste management, (g) bioengineering, (h) secondary-road design and construction, and (i) food engineering. Engineering electives are chosen from among subject areas relevant to agricultural engineering, such as thermal engineering, mechanical design and analysis, theoretical and applied mechanics, structural engineering, hydraulics, environmental engineering, soil engineering, waste management, and electronics.

## Applied and Engineering Physics

W. W. Webb, director; B. R. Kusse, associate director; B. W. Batterman, R. A. Buhrman, K. B. Cady, D. D. Clark, R. K. Clayton, T. A. Cool, H. H. Fleischmann, M. S. Isaacson, V. O. Kostroun, J. A. Krumhansl, A. F. Kuckes, A. Lewis, R. L. Liboff, R. V. Lovelace, M. S. Nelkin, T. N. Rhodin, M. M. Salpeter, B. M. Siegel, J. Silcox, R. N. Sudan, G. J. Wolga

The undergraduate engineering physics curriculum is designed for students who want to pursue careers of research or development in applied science or advanced technology. Its distinguishing feature is a focus on the fundamentals of physics, both experimental and theoretical, that have a broad applicability in engineering and science.

The industrial demand for baccalaureate graduates is high, and many students go directly to industrial positions where they work in a variety of areas, including bioengineering, computer technology, electronic-circuit design, energy conversion, geological analysis, high-voltage design, laser technology, microwave technology, nuclear technology, plasma physics, power engineering, and solid-state-device development. Other graduates go on for advanced study in fields such as astrophysics, atmospheric sciences, biophysics, computer engineering, condensed-matter physics, energy conversion, environmental science, geophysics, laser



optics, materials science and engineering, nuclear engineering, nuclear physics, oceanography, plasma physics, solid-state electronics, and statistical 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); and Physics 410, Advanced Experimental Physics (a senior course).

Undergraduates who plan to enter the Field Program in Engineering Physics are advised to arrange their Common Curriculum with certain requirements and recommendations in mind. They are encouraged to take Physics 112 during their first semester, and they are required to take Engr 221, Thermodynamics, as an engineering distribution course. Students are encouraged to satisfy the requirement for a course in computing applications with another engineering distribution course, in the area of scientific computing. Engineering physics students need to take only three engineering distribution courses, as A&EP 333, which they take in their junior year, counts as a fourth member of this category.

Students who wish to receive the Bachelor of Science degree must satisfy the requirements of the field program, outlined below, as well as the requirements of the Common Curriculum.

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
Mathematics 421 or T&AM 610 (applied mathematics)	4
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

\*Courses that will satisfy this requirement are Physics 444, Nuclear and High-Energy Particle Physics; Physics 454, Introductory Solid-State Physics; A&EP 609, Low-Energy Nuclear Physics; and EE 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.

Considerable flexibility is possible in scheduling. For example, Physics 410 may be taken in term seven or in term eight. Quantum mechanics can be studied in term six as A&EP 361 or in term seven as Physics 443. The course in applications of quantum mechanics can be taken whenever the appropriate prerequisite has been met. If scheduling conflicts arise, the school may allow substitutions 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; and a number of advanced courses in fluid mechanics or elasticity are similar to A&EP 434.

Free and technical electives need not be all formal course work; qualified students may undertake

informal study under the direction of a member of the faculty. This may include research or design projects in areas in which faculty members are active. These areas include electron microscopy and diffraction, quantum electronics, solid-state and surface physics, atomic physics, geophysics, biophysics, nuclear structure physics, nuclear engineering, and plasma physics. 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 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 specific required courses, and to attain each term an overall grade-point average of at least 2.3.

**Areas of concentration.** With a total of five electives in the junior and senior years, students can tailor the upperclass program to develop areas of concentration in accordance with their individual interests. For those who look toward an industrial position after graduation, these electives can be chosen to provide the necessary background in practical engineering. An area of concentration might be developed, for example, in digital-circuit design and fabrication. A different set of electives could be selected as preparation for medical, law, or business school. For students who plan on graduate work, 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 B. R. Kusse.

### 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 microstructure science or physical instrumentation. 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. Core courses in this specialty include the microcharacterization of electronic materials and the fabrication of microstructures and devices. The design project may focus on semiconductor materials, device physics, or microstructure science.

Each individual program is planned by the student in consultation with the program chairman. The object 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 engineering physics or 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 chairman, is carried out on an individual basis under the guidance of a member of the engineering 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 correlated 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 electrical engineering, materials science, computer science, mechanical engineering, physical geology, or bioengineering). 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 T. N. Rhodin.

## Chemical Engineering

K. E. Gubbins, director; G. F. Scheele, associate director; D. S. Clark, J. F. Cocchetto, C. Cohen, R. K. Finn, P. Harriott, R. P. Merrill, W. L. Olbricht, F. Rodriguez, M. L. Shuler, J. C. Smith, P. H. Steen, W. B. Streett, R. G. Thorpe, R. L. VonBerg, H. F. Wiegandt

### 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 biological 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	Credits
<b>Term 3</b>	
Math 293, Engineering Mathematics	3
Phys 213, Electricity and Magnetism	4
Chem 287-289, Physical Chemistry (approved elective)	5
Chem E 219 (engineering distribution course)	3
Humanities or social sciences elective	3
<b>Term 4</b>	
Math 294, Engineering Mathematics	4
Phys 214, Optics, Waves, and Particles	4
Chem 288-290, Physical Chemistry	5
Engineering distribution course	3
Humanities or social sciences elective	3
<b>Term 5</b>	
Chem 357, Organic Chemistry	3
Chem 251, Organic Chemistry Laboratory	2
Chem E 311, Chemical Engineering Thermodynamics I	3
Chem E 430, Introduction to Rate Processes	3
Elective*	3
Humanities or social sciences elective	3

## Term 6

Chem 358, Organic Chemistry	3
Chem E 312, Chemical Engineering Thermodynamics II	3
Chem E 431, Analysis of Separation Processes	4
Elective*	3
Humanities or social sciences elective	3

## Term 7

Chem E 101, Nonresident Lectures	0
Chem E 410, Reaction Kinetics and Reactor Design	3
Chem E 432, Chemical Engineering Laboratory	3
Chem E 461, Chemical Process Evaluation	3
Elective*	3
Liberal studies elective†	3

## Term 8

Chem E 462, Chemical Process Synthesis	4
Chem E 671, Process Control	3
Electives*	
Class of 1984	6
Classes of 1985 and after	3
Liberal studies elective†	3

\*The electives in terms five through eight comprise 6 credits of technical electives and 6 credits of free electives. In addition, for students of the class of 1984, the electives include 3 credits of the postponed engineering core science course (as described in the 1981-82 *Courses of Study*).

†The requirement for a liberal studies elective for the class of 1984 has become a requirement for a humanities or social sciences elective for the class of 1985 and later.

### 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. A design project is involved in the required courses. General admission and degree requirements are described in the college's introductory section.

The following courses are included in the program:

Fall term	Credits
Chem E 563, Process Equipment Design and Selection	3
Chem E 651, Numerical Methods in Chemical Engineering	3
Technical electives	9
Spring term	
Chem E 564, Design of Chemical Reactors and Multiphase Systems	3
Chem E 671, Process Control	3
Chem E 565, Design Project	3 or 6
Technical electives	3 or 6

## Civil and Environmental Engineering

School of Civil and Environmental Engineering: R. N. White, director; J. J. Bisogni, associate director

Department of Structural Engineering: P. Gergely, chairman; J. F. Abel, M. D. Grigoriu, A. R. Ingraffea, I. Ishibashi, F. H. Kulhawy, W. McGuire, A. H. Nilson, T. D. O'Rourke, T. Pekoz, F. O. Slate, R. N. White

Department of Environmental Engineering: A. H. Meyburg, chairman; J. J. Bisogni, W. H. Brutsaert, R. I. Dick, L. B. Dworsky, G. P. Fisher, J. M. Gossett, D. A. Haith, G. H. Jirka, J. A. Liggett, L. W. Lion, P. L.-F.

Liu, R. C. Loehr, D. P. Loucks, W. R. Lynn, N. Orloff, R. E. Schuler, C. Shoemaker, J. R. Stedinger, M. A. Turnquist

Program in Environmental Sensing, Measurement, and Evaluation: T. Liang, B. G. Lyon, W. R. Philipson

### Bachelor of Science Curriculum

The School of Civil and Environmental Engineering contains two departments as well as the Program in Environmental Sensing, Measurement, and Evaluation. Undergraduate specialties can be arranged in a number of subject areas encompassed by these units. The Department of Structural Engineering offers instruction in analysis, behavior, and design of structures; structural materials; and geotechnical engineering. Within the Department of Environmental Engineering there are five subject areas: environmental quality engineering; fluid mechanics and hydrology; public systems and environmental systems engineering; transportation; and water resources planning and analysis.

Students planning to enter the Field Program in Civil and Environmental Engineering are required to take Mechanics of Solids (Engr 202) during the sophomore year.\*

For the Field Program in Civil and Environmental 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
CEE 301, Numerical Solutions to Civil Engineering Problems‡	3
CEE 304, Uncertainty Analysis in Engineering**	4
CEE 323, Engineering Economics and Systems Analysis	3
CEE 332, Fluid Mechanics I	4
CEE 341, Introductory Soil Mechanics	3
CEE 351, Environmental Quality Engineering	3
CEE 361, Introduction to Transportation Engineering	3
CEE 371, Structural Behavior	4
CEE distribution courses (four courses selected from four of the seven different subject areas of CEE)	12
Technical elective	3

\*If these core science courses are used to satisfy the requirements of the Common Curriculum, more technical electives may be taken.

†Chem 208 can be substituted for Phys 214.

‡CEE 301 can be used to satisfy both the computer application requirement and an engineering distribution requirement of the Common Curriculum.

\*\*Engr 270 can be substituted for CEE 304 by petition.

### Master of Engineering (Civil) Degree Program

The M.Eng.(Civil) degree program is designed to prepare students for professional practice in civil and environmental engineering. Requirements, in addition to the general ones for the degree (see the introductory section under College of Engineering), include three required courses: one in professional engineering practice and two in design (CEE 501 and 502). The design sequence requires the completion of a project involving synthesis, analysis, decision making, and application of engineering judgment and includes an intensive, full-time, three-week session between semesters.

The remainder of a 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. The

objectives in course planning are to provide breadth in the fundamentals of civil and environmental engineering, and specialization in one area with some concentration in a related area. Most students will have achieved the necessary breadth during their undergraduate years. Some, however, may require additional course work in the graduate program to fulfill the breadth requirement. Students in the School of Civil and Environmental Engineering may avail themselves of a number of graduate course offerings in fields related to their major interest but outside of the school.

The School of Civil and Environmental Engineering, in conjunction with the Cornell Graduate School of Business and Public Administration, now offers a six-year joint program leading to the degrees of Bachelor of Science, Master of Engineering, and Master of Business Administration. Participating students receive the baccalaureate degree after four years and the two professional master's degrees in the next two years. Applications should be submitted at the beginning of the sixth term of study.

## Computer Science

Ö. Babaoğlu, K. Birman, D. Bitton, T. Coleman, R. L. Constable, R. W. Conway, A. J. Demers, J. R. Gilbert, D. Gries, J. Hartmanis, J. E. Hopcroft, G. Johnson, K. Karplus, F. T. Luk, A. Moitra, P. A. Pritchard, G. Salton, F. B. Schneider, D. Skeen, R. Teitelbaum, S. Toueg, C. Van Loan

### 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 underlies that process. Those interested in the application of computers in some particular area are ordinarily advised to major in the area of application and take elective course work in computer science.

A student entering the Field Program in Computer Science must take CS 211, CS 280, and a fourth-term mathematics course approved in the Common Curriculum before beginning the upperclass sequence. Students who do not earn a grade of B- or better in both CS 211 and CS 280 are strongly advised against attempting the computer science field program. Apart from these prerequisites and those of the college, the courses required for the Field Program in Computer Science are:

Course work	Credits
Systems sequence	8
CS 314, Systems and Organization	
CS 410, Data Structures	
Theory sequence	8
CS 481, Theory of Computing	
CS 482, Analysis of Algorithms	
Numerical Analysis	4
CS 321, Numerical Methods*	
Electrical Engineering	3
EE 230, Digital Systems*	
Computer science electives	7 or 8
Any nonrequired computer science courses numbered above 410	
Related electives	12
One mathematically oriented course plus three courses forming a coherent sequence in operations research, electrical engineering, or another technical area	

\*The courses CS 321 and EE 230 satisfy the college requirement for technical electives.

### Master of Engineering (Computer Science) Degree Program

A recent addition to the academic offerings in computer science is the one-year program leading to the degree of M.Eng.(Computer Science). The program is very small; from two to five students a

year are admitted. Admission standards are the same as those applied to doctoral candidates. A good undergraduate background in mathematics or computer science is required.

In the curriculum the emphasis can be on programming languages and systems, on theory of algorithms and theory of computation, on numerical analysis, or on information processing, which includes data bases and information organization and retrieval. (Students who are interested in logical design or computer architecture will 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

J. M. Ballantyne, director; J. L. Ross, associate director; T. Berger, R. Bolgiano, Jr., N. H. Bryant, R. R. Capranica, H. J. Carlin, G. C. Dalman, D. F. Delchamps, L. F. Eastman, T. E. Everhart, D. T. Farley, T. L. Fine, J. Frey, T. Hagfors, C. D. Heegard, M. Ilic-Spong, C. R. Johnson, Jr., K. Karplus, M. C. Kelley, M. Kim, P. M. Kintner, J. P. Krusius, W. H. Ku, C. A. Lee, R. L. Liboff, S. Linke, P. R. McIsaac, J. A. Nation, B. Nichols, C. R. Pollock, C. Pottle, A. P. Reeves, C. E. Seyler, Jr., M. W. Spong, R. N. Sudan, C. L. Tang, R. J. Thomas, J. S. Thorp, H. C. Torng, J. R. Treichler, N. M. Vrana, C. B. Wharton, E. D. Wolf, G. J. Wolga, S. L. Wood

### Bachelor of Science Curriculum

Reflecting the large scope of this engineering discipline, the undergraduate Field Program in Electrical Engineering provides a broad foundation in a number of important areas in addition to specialization in one or more.

Students can choose, for example, to concentrate in bioengineering; computer engineering; control systems; electronic-circuit design; information, communications, and decision theory; microwave electronics; plasma physics; power and energy systems; quantum and optical electronics; radio and atmospheric physics; or semiconductor devices and applications.

In addition to courses taken to satisfy the Common Curriculum requirements, the electrical engineering Bachelor of Science curriculum requirements are as follows:

Course	Credits
EE 210, Introduction to Electrical Systems*	3
EE 230, Introduction to Digital Systems†	3
EE 301, Electrical Signals and Systems‡	4
EE 303, Electromagnetic Theory I	4
EE 306, Fundamentals of Quantum and Solid-State Electronics	4
EE 315, Electrical Laboratory I	4
EE 316, Electrical Laboratory II	4
Electrical engineering electives (at least 6)‡	19
	45**

\*Engineering distribution course.

†Satisfactory completion of EE 230 as an approved elective permits the substitution of a technical elective for this requirement.

‡Of the six electrical engineering electives, two courses must be selected from EE 302, 304, 310, or 435. Two must be laboratory courses.

\*\*Credits in excess of 45 may be used to fulfill approved, technical, or free elective requirements of the Common Curriculum.

Specialization is achieved through the four senior-year electrical engineering electives, which are selected from more than sixty offerings of the school.

A brochure describing the field program and concentrations in detail may be obtained from the School of Electrical Engineering, Phillips Hall.

### Master of Engineering (Electrical) Degree Program

The M.Eng.(Electrical) degree prepares the student either for professional work in this area of engineering or for more advanced graduate study in a doctoral program. The M.Eng differs from the M.S. degree program mainly in its emphasis, which is on design capability rather than basic research. The 30-credit curriculum includes two two-term course sequences in electrical engineering, and the design project, which alone may account for 3 to 10 credits. General admission and degree requirements are described in the college's introductory section.

## Geological Sciences

D. L. Turcotte, chairman; S. B. Bachman, W. A. Bassett, J. M. Bird, A. L. Bloom, L. D. Brown, J. L. Cisne, A. K. Gibbs, B. L. Isacks, D. E. Karig, S. Kaurman, R. W. Kay, J. E. Oliver, F. H. T. Rhodes, W. B. Travers

### 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 should take certain courses during their freshman and sophomore years. These are Geol 101 and 102, Chemistry 208, and, for those interested in geobiology, Biological Sciences 101-103 and 102-104.

Geological Sciences requires six 300-level courses for the major; Geol 325, 355, 356 or 358, 376, 388, and any other 300- or 400-level course. Four science courses (see below for suggested options) and a summer field geology course are also required.

Core courses and required science courses may be taken in any reasonable sequence, except that Geol 355, which is offered in the fall, should be taken before Geol 356 or 358, which are offered in the spring. Geol 325 and 376 should be taken relatively early in the major program as preparation for the summer field camp, which usually follows the junior year, although students with adequate preparation may attend at an earlier time.

Students intending to specialize in *geophysics* should select their *required sciences* from the following courses or their equivalents:

Math 421-422-423, Applicable Mathematics  
T&AM 310-311, Advanced Engineering Analysis I and II  
A&EP 355, Intermediate Electromagnetism  
A&EP 333, Mechanics of Particles and Solid Bodies  
A&EP 356, Intermediate Electrodynamics  
A&EP 434, Continuum Physics  
Phys 410, Advanced Experimental Physics  
T&AM 450, Introduction to Continuum Mechanics

Students intending to specialize in *geochemistry* (including petrology and mineralogy) should select their *required sciences* from the following courses or their equivalents:

Chem 287-288, Introductory Physical Chemistry  
Chem 300, Introductory Quantitative Analysis  
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, Structure and Properties of Materials  
MS&E 335, Thermodynamics of Condensed Systems

Students intending to specialize in *geobiology* should select their *required sciences* from the following courses or their equivalents:

Bio S 212, Invertebrate Zoology  
Bio S 330-331, Principles of Biochemistry  
Bio S 241, Plant Biology  
Bio S 448, Plant Evolution and the Fossil Record  
Bio S 360, General Ecology  
Bio S 274, The Vertebrates  
Bio S 477, Organic Evolution  
Bio S 281, Genetics  
Chem 253, Elementary Organic Chemistry

Students who want to pursue further training or immediate employment in *applied geology* (environmental and engineering geology, groundwater, petroleum geology, or geological engineering) should select their *required sciences* from the following courses or their equivalents, with two of the four from the same field:

Agron 361, Identification, Appraisal, and Geography of Soils  
Agron 771, Soil Chemistry  
Agron 607, Soil Physics  
CEE 341, Introductory Soil Mechanics  
CEE 640, Foundation Engineering  
CEE 612, Physical Environment Evaluation  
MS&E 331, Structure and Properties of Materials  
MS&E 445, Mechanical Properties of Materials  
CEE 331, Fluid Mechanics  
CEE 332, Hydraulic Engineering  
CEE 351, Environmental Quality Engineering  
Math 421-422-423, Applicable Mathematics  
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 their *required sciences* from the group 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 speciality must choose at least two of the four required science courses from the same field, and all four required science courses must be at the 300 level or above. The technical electives may be chosen from offerings in geological sciences or in other science or engineering fields and may be courses also approved as required sciences. Outstanding students may request substitution of an honors thesis for a fourth-year technical elective.

Students intending to pursue graduate study in geology are reminded that many 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.

## Materials Science and Engineering

A. L. Ruoff, director; D. G. Ast, J. M. Blakely, C. B. Carter, A. M. Donald, D. T. Grubb, E. W. Hart, H. H. Johnson, D. L. Kohlstedt, E. J. Kramer, C. Y. Li, J. W. Mayer, R. Raj, S. L. Sass, D. N. Seidman

## Bachelor of Science Curriculum

Students who major in materials science and engineering are required to take Engr 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 freshman or sophomore year. 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, metallurgy, ceramic materials, polymeric materials, or electrical materials. Specialization is achieved through the selection of free and technical electives in the junior and senior years. In addition to the courses needed to satisfy the requirements of the Common Curriculum, the materials science and engineering field program leading to the Bachelor of Science degree consists of:

Courses	Credits
MS&E 331, Structure and Properties of Materials	4
MS&E 333, Research Involvement I, or a field-approved elective*	3
MS&E 335, Thermodynamics of Condensed Systems	3
MS&E 332, Electrical and Magnetic Properties of Materials	3
MS&E 334, Research Involvement II, or a field-approved elective*	3
MS&E 336, Kinetics, Diffusion, and Phase Transformations	3
MS&E 441, Microprocessing of Materials	3
MS&E 443, Senior Materials Laboratory I	3
MS&E 445, Mechanical Properties of Materials	3
MS&E 442, Macroprocessing of Materials	3
MS&E 444, Senior Materials Laboratory II	3
MS&E 446, Current Topics in Materials	3

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\*The research-involvement option gives undergraduates the opportunity to work with faculty members and their research groups on current projects. The alternative field-approved elective provides students interested in industrial careers with an additional opportunity to broaden their engineering education.

## Master of Engineering (Materials) Degree Program

Students who have completed a four-year undergraduate program in engineering or the physical sciences are eligible for consideration for admission to the M.Eng.(Materials) program, which includes the following:

- 1) A project qualifying for at least 12 credits and requiring individual effort and initiative. This project, carried out under the supervision of a member of the faculty, is usually experimental, although it can be analytical.
- 2) Six credits of courses in mathematics or applied mathematics. This requirement may be satisfied by courses T&AM 310 and 311; students who have previously completed these must select other courses acceptable to the faculty.
- 3) Courses in materials science and engineering selected from any of those offered at the graduate level or other courses approved by the faculty, required to bring the total credits to 30.

General admission and degree requirements are described in the introductory section under College of Engineering.

## Mechanical and Aerospace Engineering

A. R. George, 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, F. C. Gouldin, S. Leibovich, M. C. Leu, J. L. Lumley, F. K. Moore, R. M. Phelan, S. L. Phoenix, S. B. Pope, E. L. Resler, Jr., S. F. Shen, D. G. Shepherd, D. L. Taylor, K. E. Torrance, K. K. Wang, Z. Warhaft, R. L. Wehe

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, vibrations and control systems, bioengineering, 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) and Engr 221 (also M&AE 221) as either engineering distribution courses or as approved or free electives, and Engr 203 (also T&AM 203) as either an approved or free elective. All these courses are prerequisites for courses to be taken during the junior year. During either the sophomore or junior year, students take Engr 210 (also EE 210) as an engineering distribution course or as an approved or free elective.

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 six required courses (beyond Engr 202, 203, 210, and 221, already mentioned) and six elective courses (18 credits). The six required field courses are:

M&AE 311, Materials and Manufacturing Processes  
M&AE 323, Introduction to Fluid Mechanics  
M&AE 324, Heat Transfer  
M&AE 325, Mechanical Design and Analysis  
M&AE 326, Systems Dynamics  
M&AE 327, Mechanical Engineering Laboratory.

The six elective courses consist of two alternate technical electives (6 credits), one mathematics elective (3 credits), and three field electives (9 credits). These electives are chosen from lists approved by the faculty of the Sibley School of Mechanical and Aerospace Engineering.

It is recommended (but not required) that students without previous experience in mechanical drawing take either Engr 102 (also M&AE 102), Drawing and Engineering Design (1 credit), or Ag En 153, Engineering Drawing (2 credits). The computer applications requirement of the Common Curriculum may be satisfied by several courses, including M&AE 489, 570, and 575.

The requirements listed are those now in effect for the class of 1985 and beyond and are subject to change by the faculty of the school. Requirements for earlier classes differ somewhat from the ones listed.

If Introduction to Mechanical Properties of Materials (MS&E 261) is taken before entry into the field program, Materials and Manufacturing Processes (M&AE 311) may be replaced by an alternate technical elective, although M&AE 311 is still recommended.

Introduction to Electrical Systems (EE 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) program is designed to increase the student's facility in the application of the basic sciences to important professional problems. 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.

General admission and degree requirements are described in the introductory section under College of Engineering.

Required courses for the M.Eng.(Aerospace) degree include two related sequences from the following list.

Core courses available	Credits
M&AE 506, Aerospace Propulsion Systems	3
M&AE 507, Dynamics of Flight Vehicles	3
M&AE 530, Fluid Dynamics	3
M&AE 531, Boundary Layers	3
M&AE 536, Turbomachinery and Applications	3
M&AE 543, Combustion Processes	3
M&AE 559, Introduction to Controlled Fusion	3

M&AE 569, Mechanical and Aerospace Structures I	3
M&AE 601, Foundations of Fluid Dynamics and Aerodynamics	4
M&AE 602, Incompressible Aerodynamics	4
M&AE 603, Compressible Aerodynamics	4
M&AE 608, Physics of Fluids I	4
M&AE 609, Physics of Fluids II	4
M&AE 610, Gasdynamics	4
M&AE 630, Atmospheric Turbulence and Micrometeorology	4
M&AE 648, Seminar on Combustion	4
M&AE 653, Experimental Methods in Fluid Mechanics, Heat Transfer, and Combustion	4
M&AE 670, Mechanical and Aerospace Structures II	4
M&AE 704, Theory of Viscous Flows	4
M&AE 707, Aerodynamic Noise Theory	4
M&AE 732, Analysis of Turbulent Flows	4
M&AE 733, Stability of Fluid Flow	4
M&AE 734, Turbulence and Turbulent Flow	4
M&AE 737, Numerical Methods in Fluid Flow and Heat Transfer	4

Also required are 6 credits of technical electives. A list of suggested electives is available from the M.Eng.(Aerospace) program representative in Upson Hall. Further requirements include 6 credits of mathematics (T&AM 610-611 or Mathematics 515-516 or the equivalent), participation in the weekly colloquium (1 credit each term), one advanced seminar (2 credits), and one professional design project (2 credits). A total of 30 credits, including the project, are required.

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 want 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 are biomechanical engineering, combustion, energy and power systems, fluid mechanics, heat transfer, materials and manufacturing engineering, and mechanical systems and design. 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. 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. In special cases a student may petition the Master of Engineering Committee of the Sibley School of Mechanical and Aerospace Engineering to 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. The proposed curriculum together with a statement of overall objectives and a statement of the purpose of the major is submitted for approval to the Master of Engineering Committee in the school. 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 21 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.

## 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 K. B. Cady (faculty representative), D. D. Clark, H. H. Fleischmann, D. A. Hammer, and V. O. Kostroun.

### 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.

### College Programs

The suggested curriculum for the College Program in Nuclear Engineering includes NS&E 303, 304, 305, Introduction to Nuclear Science and Engineering I, II, and III, plus two of the four courses A&EP 612, 651, 633, and 609. Also available is the College Program in Energy Conversion, a synthesis of nuclear, thermal, and electrical engineering. See the introductory section under College of Engineering for a general description of the College Program.

### Master of Engineering (Nuclear) Degree Program

The two-term curriculum leading 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 612, Nuclear Reactor Theory I  
A&EP 633, Nuclear Engineering  
A&EP 609, Low-Energy Nuclear Physics  
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, Transport Processes II  
EE 581, Introduction to Plasma Physics  
EE 582, Advanced Plasma Physics  
EE 571, Feedback Control Systems  
EE 572, Digital Control Systems  
A&EP 613, Nuclear Reactor Theory II  
A&EP 652, Advanced Nuclear and Reactor Laboratory  
A&EP 636, Seminar on Thermonuclear Fusion Reactors  
A&EP 638, Intense Pulsed Electron and Ion Beams: Physics and Technology  
MS&E 705, The Effects of Radiation on Materials  
NS&E 484, Introduction to Controlled Fusion: Principles and Technology

## Operations Research and Industrial Engineering

L. E. Trotter, Jr., director; L. J. Billera, graduate faculty representative; J. A. Muckstadt, graduate professional programs representative; R. E. Bechhofer, R. G. Bland, D. C. Heath, P. L. Jackson, W. F. Lucas, W. L. Maxwell, G. L. Nemhauser, N. U. Prabhu, R. Roundy, T. J. Santner, L. W. Schruben, M. S. Taqqu, H. M. Taylor 3d, M. J. Todd, B. W. Turnbull, L. I. Weiss

### Bachelor of Science Curriculum

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.

A student who plans to enter the Field Program in Operations Research and Industrial Engineering should take Introductory Engineering Probability (Engr 260). For a student who has not taken Engr 260, entry into the field program in OR&IE is possible only by permission of the associate director. In addition, it is recommended that Computers and Programming (CS 211 or Engr 211) be taken before entry into the OR&IE field program. Early consultation with an OR&IE faculty member or with the associate director can be helpful in making appropriate choices. The required courses for the OR&IE 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 361, Introductory Engineering Stochastic Processes	4
CS 211, Computers and Programming*	3
Liberal studies elective	3
Term 6	
OR&IE 321, Optimization II	4
OR&IE 370, Introduction to Statistical Theory with Engineering Applications	4
OR&IE 410, Industrial Systems Analysis	4
Behavioral science†	3
Liberal studies elective	3

\*If CS 211 already has been taken, a three- or four-credit technical elective must be substituted.

†The behavioral science requirement can be satisfied by any one of several courses of an advanced nature, including Business and Public Administration NCE 540 (recommended for those contemplating the pursuit of a graduate business degree), B&PA NCE 541; Industrial and Labor Relations 120, 121, 151, 221, 260, 320, and 370. The adviser must approve the selection in all cases.

The basic senior-year program, from which individualized programs are developed, comprises 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 liberal-studies electives	6
Two free electives	6

Available OR&IE electives are as follows:

Industrial systems: OR&IE 417, 421,\* 551, 562, and B&PA NBA 562  
Optimization methods: OR&IE 431 and 435  
Applied probability and statistics: OR&IE 462, 471, 472, 561, 563, and 570

\*Students who plan to participate in the cooperative program with the Graduate School of Business and Public Administration must select OR&IE 421.

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 end 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 Industrial 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.

I. For matriculants with preparation comparable to that provided by the undergraduate Field Program in Operations Research and Industrial Engineering:

Fall term	Credits
OR&IE 516, Case Studies	4
OR&IE 893, Applied OR&IE Colloquium	1
OR&IE 599, Project	1
Three technical electives	9
Spring term	
OR&IE 551, Advanced Engineering Economic Analysis	4
OR&IE 894, Applied OR&IE Colloquium	1
OR&IE 599, Project	minimum of 4
Two technical electives	6

The electives specified above will normally be chosen from graduate courses offered by the School of Operations Research and Industrial Engineering.

II. For matriculants from other fields who minimally fulfill the prerequisite requirements. Students who have the equivalent of OR&IE 370, 622, and 623 will take technical electives in their place.

Fall term	Credits
OR&IE 370, Introduction to Statistical Theory with Engineering Applications	4
OR&IE 622, Operations Research I	3
OR&IE 516, Case Studies	4
OR&IE 580, Digital Systems Simulation	4
OR&IE 893, Applied OR&IE Colloquium	1
OR&IE 599, Project	1
Spring term	
OR&IE 623, Operations Research II	3
OR&IE 551, Advanced Engineering Economic Analysis	4
OR&IE 894, Applied OR&IE Colloquium	1
OR&IE 599, Project	minimum of 4
Technical elective	3

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 various operating organizations such as manufacturing firms, retailing organizations, service organizations, government agencies, and educational institutions.

## Cooperative Program with Business and Public Administration

Undergraduates majoring in operations research and industrial 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 the systems.) Getting started early 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.

Essential aspects of the program as it pertains to the M.B.A. degree are:

- 1) By the end of the fifth year, the candidate completes—through course work, advanced standing, or exemption examinations—the core course work required for the M.B.A. degree, except for B&PA NBP 503, Business Policy.

2) A maximum of 30 credits toward the M.B.A. degree can be earned for courses taken before the start of the sixth year; these credits may be earned in the undergraduate B.S. program, in the M.Eng. program, or in the Graduate School of Business and Public Administration.

3) During the sixth year, over a period of two semesters, the candidate earns 26 credits in elective courses approved by the business school, plus 4 credits for B&PA NBP 503, Business Policy.

In accordance with this plan 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, Upson Hall.

## Theoretical and Applied Mechanics

F. C. Moon, chairman; J. A. Burns, H. D. Conway, E. W. Hart, P. J. Holmes, C. Y. Hui, J. T. Jenkins, R. H. Lance, G. S. S. Ludford, S. Mukherjee, Y. H. Pao, R. H. Rand, A. L. Ruina, W. H. Sachse

### 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.

## 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	Ag En
Applied and Engineering Physics	A&EP
Chemical Engineering	Chem E
Civil and Environmental Engineering	CEE
Computer Science	CS
Electrical Engineering	EE
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

**102 Drawing and Engineering Design (also M&AE 102)** Fall, spring. 1 credit. Half-term course offered twice each semester. Recommended for students without previous mechanical drawing experience. S-U grades optional. Enrollment limited. 2 lects, 1 lab.

Practical demonstration of the relationship between engineering principles and the creative solution of real problems. Drawing and graphic techniques useful in design, analysis, and presentation of ideas. Computer graphics applied to problems of engineering design through use of CADIF (Computer-Aided Design Instructional Facility).

**105 Introduction to Computer Programming (also CS 100)** Fall, spring. 4 credits. The course content is the same as that of C S 100.

2 lecs, 1 rec (optional), 3 evening exams. An introduction to elementary computer programming concepts. Emphasis is on techniques of problem analysis and algorithm and program development. The subject of the course is programming, not a particular programming language. The principal programming language is PL/1; FORTRAN is introduced and used for final problems. 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.

**110 The Laser and Its Applications in Technology, Science, and Medicine (also A&EP 110)** Fall, spring. 3 credits.

2 lecs, 1 lab. T. A. Cool, A. Lewis. The principles of laser action, types of laser systems, elements of laser design, and the 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-induced chemistry, Raman spectroscopy, frequency doubling, and interferometry. Guest lectures by prominent medical and industrial scientists introduce students to current fields of laser application and research.

**111 Elements of Materials Science (also MS&E 201)** Fall, spring. 3 credits.

Autotutorial. Relations between atomic structure and macroscopic properties of such diverse materials as metals, ceramics, and polymers. Properties discussed include magnetism, superconductivity, insulation, semiconductivity, mechanical strength, and plasticity. Applications to microelectronics, desalination by reverse osmosis, superconducting power transmission lines, synthetic bones and joints, etc. Extensive use of slides, tapes, and films.

**112 Introduction to Chemical Engineering (also Chem E 112)** Fall, spring. 3 credits. Limited to freshmen.

3 lecs. F. Rodriguez. This course is designed to acquaint students with the scope of chemical engineering. Topics such as polymers, fluid flow, and plant design will be introduced at an elementary level. Quantitative discussions buttressed by lecture demonstrations will show how the engineering approach differs from a purely scientific one. The rapid solving of numerical problems is emphasized on homework and tests.

**113 Computer-aided Design in Environmental Systems (also CEE 113)** Fall. 3 credits

3 lecs. C. A. Shoemaker, M. A. Turnquist. Planning, design, and management of environmental systems. Emphasis on use of computer-aided techniques, including interactive computer graphics. Sample problems will include flood control, transportation network design, water quality management, and nuclear waste disposal. The objective of the course is to provide students with an opportunity to experiment with alternative design and management strategies in several areas of environmental engineering.

**114 Introduction to Microprocessors (also EE 114)** Fall, spring. 3 credits.

2 lecs, 1 lab.

Basic concepts of microprocessor organization and programming languages are developed in conjunction with microprocessor control of input and output devices. These ideas are used to develop applications of the microprocessor to engineering, scientific, and commercial problems. Each student has access to a microprocessor system in the laboratory and will develop and test programs on this system. Selected engineering problems will be solved in the laboratory using the microprocessor systems.

**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.

**116 Modern Structures: Behavior, Design, and Construction (also CEE 116)** Spring. 3 credits.

2 lecs. A. R. Ingrassia, F. H. Kulhawy, W. McGuire. A major structure, such as a skyscraper or a bridge, participates in a highly complex system together with its foundation and the rock or soil on which it is built. Its construction must honor financial constraints; it must function properly; and it must be safe for its users. This course will focus on how typical structural systems behave under different loadings (self-weight, wind, traffic, snow, earthquake, thermal stress, etc.); how they are designed; how materials are selected; and how construction is carried out. Case studies will be presented. Lectures and laboratory sessions will deal with the elements of structure and foundation analysis, the principal construction materials (steel, concrete, soil, and rock) used in civil engineering, and construction methods. Computer graphics (at CADIF) will be utilized for structural analysis.

**117 Introduction to Mechanical Engineering (also M&AE 117)** Fall, spring. 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: energy conversion, and mechanical design and manufacturing.

**118 Introductory Geological Sciences (also Geol 101)** Fall, spring. 3 credits.

2 lecs, 1 lab, field trips. Evening exams. W. B. Travers, fall; A. L. Bloom, spring. Understanding the natural earth: weathering, erosion, the evolution of coastlines and river valleys, glaciation, the origins of earthquakes and mountains, the genesis of volcanoes, and the drifting of continents. Studies of groundwater, mineral deposits, petroleum, and coal. Recognizing major minerals and rocks, interpreting topographic and geologic maps.

**119 Introduction to Manufacturing Engineering (also M&AE 119 and OR&IE 119)** Spring. 3 credits.

2 lecs, 1 lab. Engineering considerations in the design, manufacturing, distribution, and service of products. Transformation from functional requirements to material and processing specifications. Engineering problems in the design and management of a manufacturing facility and distribution channels. Visits will be made to local industries.

**120 Problem Solving and Modeling (also OR&IE 120)** Spring. 3 credits. Not offered 1983-84.

2 lecs, 1 lab. W. F. Lucas.

A general overview of the fields of systems analysis, operations research, policy science, and decision making, with selected applications from engineering and interdisciplinary areas. The nature of mathematical modeling and patterns of problem solving will be stressed. Optimization, networks, scheduling, logistics, control, equity analysis, and conflict resolution will be covered. Ways of taking into account measurement and utility, uncertainty and risk, multiple objectives, and simulation will be considered. Contemporary problems, recent discoveries, and newer subject areas will be treated.]

**121 Fission, Fusion, and Radiation (also NS&E 121)** Fall, 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.

**122 Composite Materials: Design and Applications (also MS&E 122)** Fall. 3 credits.

2 lecs, 1 lab or rec. Composites are combinations of materials arranged to produce new, superior materials. Wood and bone are natural composites; because of their lightness and strength, carbon-fiber composites are used in cars, tennis rackets, and Lear airplanes. This course deals with the general principles that lead to better materials. There will be a detailed study of the design and manufacture of practical synthetic composites. Students will make and test their own composites in the laboratory. Results will be related to the use of composites in space-age vehicles.

**202 Mechanics of Solids** 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, singularity functions; plane stress; Mohr's circle; bending and torsion of bars; buckling and plastic behavior.

**203 Dynamics** 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, and a rigid body. Kinematics, motion relative to a moving frame. Impulse, momentum, angular momentum, energy. Rigid-body kinematics, angular velocity, moment of momentum, and the inertia tensor. Euler equations, the gyroscope.

**210 Introduction to Electrical Systems (also Engr 210)** Fall, spring. 3 credits. Prerequisites or corequisites: Mathematics 293 and Physics 213.

3 lecs and optional tutorial sections. 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.

**211 Computers and Programming (also CS 211)** Fall, spring. 3 credits. Prerequisite: CS 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, invariant relations, block structure, recursion, and introduction to data structures and analysis of algorithms. PL/1 is the principal programming language used.

**219 or 220 Mass and Energy Balances (also Chem E 219, 220)** 219, fall; 220, summer. 3 credits. Prerequisite: one year of freshman chemistry. 219 is recommended for students planning to enter the Field Program in Chemical Engineering.

R. G. Thorpe.  
Engineering problems involving material and energy balances. Batch and continuous reactive systems in the steady and unsteady states. Humidification processes. Chem E 220 differs from 219 in that it uses only self-paced audiovisual instruction at the convenience of the student. A minimum of 70 clock hours of audiovisual instruction is required to master the subject matter. Student performance in 220 is evaluated by nine tests, two preliminary examinations, and a final examination; superior students may earn exemption from the final examination.

**221 Thermodynamics** Fall, spring. 3 credits. Prerequisites: Mathematics 191-192 and Physics 112.

3 recs.  
The definitions, concepts, and laws of thermodynamics. Applications to ideal and real gases, multi-phase pure substances, gaseous reactions. Heat-engine and heat-pump cycles, with an introduction to energy-conversion systems.

**260 Introductory Engineering Probability (also OR&IE 260)** Fall, spring. 3 credits. Prerequisite: first-year calculus.

3 lects.  
The basic tools of probability and their use in engineering. 260 may be the last course in probability for some students, or it may 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.

**261 Introduction to Mechanical Properties of Materials** Fall, spring. 3 credits.

2 lects, 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.

**262 Introduction to Electrical Properties of Materials** Spring. 3 credits.

2 lects, 1 rec or lab.  
Electrical and structural properties of semiconductors, oxide layers, and metal films that are used in modern integrated circuits. Crystal structure, growth of semiconductors, deposition of thin films, electrical conduction, p-n junctions, transistors, and light-emitting diodes. Interplay between structural and electrical properties and their application to the design of semiconductor devices and integrated circuits.

**270 Basic Engineering Probability and Statistics** Fall, spring. 3 credits. Students who intend to enter the upperclass Field Program in Operations Research and Industrial Engineering should take Engr 260 instead of this course. Prerequisite: first-year calculus.

3 lects.  
At the end of this course a student should command a working knowledge of basic probability and statistics as they apply to engineering work. For students who want to have greater depth in probability and

statistics, a course in probability (OR&IE 260) followed by a course in statistics (OR&IE 370) is recommended.

**321 Numerical Methods (also CS 321)** Fall, spring. 4 credits. Prerequisites: Mathematics 293 or 221 and knowledge of FORTRAN equivalent to that taught in CS 100.

3 lects.  
Students solve representative problems by programming appropriate algorithms and using library programs. Numerical methods for systems of linear equations, interpolation, integration, ordinary differential equations, nonlinear equations, optimization, and linear least squares.

## Agricultural Engineering

Courses in agricultural engineering will be found in the section listing the offerings of the College of Agriculture and Life Sciences.

## Applied and Engineering Physics

**110 The Laser and Its Applications in Science, Technology, and Medicine (also Engr 110)** Fall, spring. 3 credits. This is a course in the Introduction to Engineering series.

2 lects, 1 lab. T. A. Cool, A. Lewis.  
For description see Engineering Common Courses.

**206 Introduction to Biophysics** Fall. 3 credits. Prerequisite: concurrent registration in Physics 213 or permission of instructor.

3 lects. A. Lewis.  
A systematic introduction to the quantitative study of biological systems. Intended for science students and engineers who want to see how biological systems exemplify the ultimate in design. Topics, chosen to show the interdependence of all living matter, are photosynthetic energy conversion,  $O_2$  and starch (focusing on the relation of hemoglobin and metabolism to membranes), perception, replication, and the connection between biophysics and genetic engineering.

**217 The Physics of Energy** Spring. 3 credits. Prerequisite: Physics 213 or permission of instructor.

2 lects, 1 rec-lab. T. N. Rhodin.  
An introduction to the production, conversion, and control of energy. Nuclear reactions, plasma properties, and solid-state electronics are related to the design and development of large-scale energy sources. Basic physical concepts are related to specific applications in practical systems. Students gain laboratory experience in activation analysis, plasma diagnostics, and photovoltaic cell characterization. At the level of *Foundations of Nuclear Energy*, by Connolly, or *An Introduction to Physics*, by Romer.

**264 Computerized-Instrumentation Design** Fall, spring. 3 credits.

1 lec, 1 lab. A. F. Kuckes.  
This laboratory course teaches design techniques for incorporating small computers into experimental apparatus. Experiments in elementary physics are performed with appropriate sensors wired to computer interfaces. Experiments are done under program control using routines written in BASIC and ASSEMBLY languages. Experiments use analog-to-digital converters, digital-to-analog converters, optical encoders, and stepping motors. Graphic display of data and theoretical fit are emphasized.

**303 Introduction to Nuclear Science and Engineering I (also NS&E 303)** Fall 3 credits. Prerequisite: Physics 214 or Mathematics 294. This course and A&EP 304 form a coordinated, two-term

sequence 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. The sequence can also serve as a basic course for those who do not intend to continue in the field. 303 is a reasonably self-contained unit that can be taken by itself by those desiring only one term.

3 lects. D. D. Clark.  
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.

**304 Introduction to Nuclear Science and Engineering II (also NS&E 304)** Spring 3 credits. Prerequisite: A&EP 303.

3 lects. D. D. Clark.  
Introduction to aspects of nuclear reactor engineering and to controlled fusion. Topics include heat-transfer and safety problems in fission reactors; principles, configurations, and engineering problems of proposed fusion reactors; radiation detection, shielding, biological effects of radiation, and materials damage.

**333 Mechanics of Particles and Solid Bodies** Fall. 4 credits.

3 lects, 1 rec. J. Silcox.  
Newton's laws; coordinate transformations; generalized coordinates and momenta. Lagrangian and Hamiltonian formulation; applications to oscillator, restrained motion, central forces, small vibrations of multiparticle systems, motion of rigid body.

**355 Intermediate Electromagnetism** Fall. 4 credits. Prerequisites: Physics 214 and coregistration in Mathematics 421 or T&AM 610, or permission of instructor.

3 lects, 1 rec. H. H. Fleischmann.  
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, skin effect, quasistatics. Emphasis on physical concepts and applications to design of high-voltage generators, electron guns, and particle accelerators.

**356 Intermediate Electrodynamics** Spring. 4 credits. Prerequisite: A&EP 355 and coregistration in Mathematics 422 or T&AM 611, or permission of instructor.

3 lects, 1 rec. R. V. Lovelace.  
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.

**361 Introductory Quantum Mechanics** Spring. 4 credits. Prerequisites: A&EP 333 or Physics 318; coregistration in Mathematics 422 or T&AM 611 and in A&EP 356 or Physics 326.

3 lects, 1 rec. V. O. Kostroun.  
A first course in the systematic theory of quantum phenomena. Topics include the square well, harmonic oscillator, hydrogen atom, and perturbation theory. At the level of Chapters 4-9 of *Modern Physics and Quantum Mechanics*, by Anderson.

**363 Electronic Circuits (also Physics 360)** Fall, spring. 4 credits. Prerequisite: Physics 268 or 213 or permission of instructor; no previous experience with electronics is assumed. Fall term is generally less crowded.

1 lec, 2 labs. Fall, W. Ho; spring, H.H. Fleischmann.  
This laboratory course focuses on designing, building, and testing analog, digital, and microprocessor-based circuits that are useful in electronic instrumentation. Analog topics include basic circuit concepts, applications of operational amplifiers in linear circuits, oscil-

lators and comparators, transistor circuits, and diodes in power supplies, waveform-shaping circuits, and protective circuits. Students also design and build digital circuits that incorporate Schmidt triggers, comparators, combinatorial and sequential logic using medium-scale integrated circuits. The above circuits are also interfaced to a microprocessor whose architecture, machine instruction set, and programming principles are studied. At the level of *Principles of Electronic Instrumentation*, by Diefenderfer.

#### 401 Physics of Atomic and Molecular

**Processes** Fall. 3 credits. Prerequisite: A&EP 361, Physics 443, or permission of instructor. Not offered 1983-84.

An introduction to the basics of contemporary problems in the physics of atomic and molecular processes, including atomic structure, chemical bonding, polarization, radiation resonance processes, and atomic and molecular spectroscopy.]

#### 423 Statistical Thermodynamics

Spring. 4 credits. For engineering physics seniors; others by permission of instructor.

3 lecs. 1 rec. B. R. Kusse.

Quantum statistical basis for equilibrium thermodynamics, 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 *Statistical and Thermal Physics*, by Reif.

#### 434 Continuum Physics

Fall. 4 credits. Prerequisites: A&EP 333 and 356 or equivalent.

3 lecs. 1 rec. R. Lovelace.  
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, Bernoulli'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.

#### 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 of forms; for example, design of laboratory apparatus, performance of laboratory measurements, or theoretical design or analysis.

#### 601 Photosynthesis (also Biological Sciences

**445)** Fall. 3 credits. Prerequisites: Chemistry 104 or 208, Mathematics 106 or 111, and Physics 102 or 208, or permission of instructor. Offered alternate years.

R. K. Clayton.

A detailed study of the process by which plants use light in order to grow, emphasizing physical and physiochemical aspects.

#### 606 Introduction to Plasma Physics (also EE

**581)** Fall. 3 credits. Prerequisites: A&EP 355, 356 or equivalent. Open to fourth-year students at discretion of instructor.

3 lecs. R. N. Sudan.

Plasma state; motion of charged particles in fields; collisions, coulomb scattering; transport coefficients, ambipolar diffusion, plasma oscillations and waves; hydromagnetic equations; hydromagnetic stability and microscopic instabilities; test particle in a plasma; elementary applications.

#### 607 Advanced Plasma Physics (also EE 582)

Spring. 3 credits. Prerequisite: A&EP 606.

3 lecs. R. N. Sudan.

Boltzmann and Vlasov equations; waves in hot plasmas; Landau damping, micro-instabilities; drift

waves, low-frequency stability, collisional effects; method of dressed test particles; high-frequency conductivity and fluctuations; neoclassical toroidal diffusion, high-powered beams.

#### 608 Plasma Astrophysics (also Astronomy

**660)** Spring. 2 credits. Not offered 1983-84.

R. V. Lovelace.

Selected topics discussed in detail: (a) the solar corona and the solar wind, (b) hydrodynamic and magnetohydrodynamic flows around compact objects in galactic nuclei, (c) global electrodynamics of double radio sources.]

#### 609 Low-Energy Nuclear Physics

Fall. 4 credits. Prerequisite: an introductory course in modern physics, including quantum mechanics.

3 lecs. V. Kostroun

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.

#### 611 Vision (also Biological Sciences 395)

Fall. 3 credits. Prerequisites: Chemistry 104 or 208, Mathematics 106 or 111, Physics 102 or 208, or permission of instructor. Offered alternate years.

R. K. Clayton.

Study of the mechanisms of seeing, embracing biological, physical, and chemical approaches to the subject.

#### 612 Nuclear Reactor Theory I

Fall. 4 credits. Prerequisites: a year of advanced calculus and some nuclear physics.

3 lecs. K. B. Cady.

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.

#### 613 Nuclear Reactor Theory II

Spring. 3 credits. A continuation of A&EP 612, primarily intended for students planning research in nuclear reactor physics and engineering. Prerequisite: A&EP 612.

3 lecs. K. B. Cady.

The Boltzmann linear transport equation, its adjoint, and their approximate solutions are developed and applied to the heterogeneous neutron chain reactor.

#### 614 Special Topics in Biophysics

Offered alternate years. Not offered 1983-84.

W. W. Webb.

Topics, credits, and schedule to be announced. Seminars on selected topics of current interest in biophysics research.]

#### 615 Membrane Biophysics

Fall. 3 credits. Not offered 1983-84.

W. W. Webb.

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. 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.]

#### 616 Modern Physical Methods in Macromolecular

**Characterization** Spring. 3 credits. Prerequisite: permission of instructor or a course in quantum mechanics. Intended for advanced undergraduates or graduate students. Offered alternate years. Not offered 1983-84.

A. Lewis.

Modern physical methods of macromolecular characterization, with emphasis on techniques such as subpicosecond and picosecond fluorescence and absorption spectroscopy, excited and ground-state

dipole-moment measurement, tunable-laser thermal-lens spectroscopy, tunable-laser Raman and coherent anti-Stokes Raman spectroscopy of ground and excited molecular states, and the measurement of vibrational optical activity. The course should appeal to students who are interested either in the use of such physical techniques for characterizing materials or in the physics of macromolecules and macromolecular assemblies. Macromolecular systems used as examples are of biological interest or are physically interesting polymeric materials.]

#### 622 Electron Optics

Spring. 3 credits. Offered alternate years.

M. S. Isaacson.

Basic electron optics with emphasis on the fundamental principles of the production and focusing of charged-particle beams. Special consideration is given to the optics appropriate for beam transport and probe forming systems and systems useful in materials characterization. Included are discussions of the calculation of trajectories in multicomponent optical systems, comprehensive treatments of optical aberrations, and practical considerations of electron optical design.

#### 633 Nuclear Engineering

Fall. 4 credits. Prerequisite: introductory course in nuclear engineering.

K. B. Cady.

The fundamentals of nuclear reactor engineering, reactor siting and safety, fluid flow and heat transfer, control, and radiation protection.

#### 634 Nuclear Engineering Design Seminar

Spring. 4 credits. Prerequisite: A&EP 633.

K. B. Cady.

A group design study of a selected nuclear system. Emphasis is on safety, siting, and radiation protection in the design of nuclear systems.

#### 636 Seminar on Thermonuclear Fusion Reactors

Fall. 3 credits. Prerequisite: basic course in plasma physics or nuclear reactor engineering, or permission of instructor. Not offered 1983-84.

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.]

#### 638 Intense Pulsed Electron and Ion Beams:

**Physics and Technology** Spring. 2 credits. Prerequisites: EE 581, 582 (A&EP 606, 607), or equivalent; or permission of instructor.

D. A. Hammer.

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.

#### 651 Nuclear Measurements Laboratory

Spring. 4 credits. Prerequisite: some nuclear physics.

Two 2 1/2-hour afternoon periods plus 1 lec. Staff. Lectures on interaction of radiation with matter, radiation biology, and nuclear instruments and measurements. Fifteen experiments are available (from which eight are selected) on nuclear physics, radiation instrumentation and measurements, activation analysis, neutron moderation, and reactor physics and engineering; the subcritical reactor assembly and TRIGA reactor are used. At the level of *Nuclear Radiation Detection*, by Price, and *Radiation Detection and Measurement*, by Knoll.

#### 652 Advanced Nuclear and Reactor Laboratory

Spring. 3 credits. Prerequisites: A&EP 651 and 609 or 612. Offered on independent study basis or, with sufficient demand, as a formal course.

Two 2 1/2-hour afternoon periods.

Laboratory experiments and experimental methods in nuclear physics and reactor physics. Ten experiments are available, some using the Zero Power Reactor critical facility.

### 653 Special Topics Seminar in Applied Physics

Fall, spring. 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 areas of atomic, plasma, biological, and solid-state physics, as suggested by the students and coordinated by the instructor.

**661 Microcharacterization** Fall. 3 credits. Prerequisites: Physics 112, 213, and 214, or an introductory course in modern physics.

M. Isaacson.  
The basic physical principles underlying the many modern microanalytical techniques available for characterizing materials. Discussion centers on the physics of the interaction process by which the characterization is performed, the advantages and limitations of each technique, and the instrumentation involved in each characterization method (including charged-particle optics when appropriate).

**662 Microprocessing of Materials** Spring. 3 credits.

R. A. Buhrman.  
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.

### 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.

### 711 Principles of Diffraction (also MS&E 610)

Fall. 3 credits. Offered alternate years.

B. W. Batterman.  
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.

**751, 752 Project** 751, fall; 752, spring. Credit to be arranged.

Informal study under the direction of a member of the University staff. Students are offered some research experience through work on a special problem related to their field of interest.

### 761 Kinetic Theory (also EE 681)

Fall. 3 credits. Prerequisite: EE 407 or Physics 561 or permission of instructor. Offered alternate years.

2 lecs. P. L. Liboff.  
See EE 681 for course description.

### 762 Physics of Solid Surfaces and Interfaces

Fall. 3 credits. Lecture course primarily for graduate and qualified senior students. Prerequisites: Physics 454 and A&EP 361. Similar to MS&E 703.

T. N. Rhodin.

A critical presentation of current understanding of the physics and chemistry of surface and interface phenomena in metals, semiconductors, and ionic solids. Application of quantum and statistical mechanics to a discussion of the microscopic behavior of electrons, atoms, ions, and molecules at phase boundaries in condensed matter. Emphasis on the electron structure, surface crystallography, and chemical reactivity of both ideal and practical solid surfaces. Theory and application of modern methods of electron spectroscopy in ultrahigh physics. Material drawn from the current research literature is presented at the level of *The Nature of the Surface Chemical Bond*, edited by Rhodin and Ertl.

## Chemical Engineering

**101 Nonresident Lectures** Fall. No credit.

1 lec. R. L. VonBerg.  
Given by lecturers invited from industry and from selected departments of the University to assist students in their transition from college to industrial life.

**112 Introduction to Chemical Engineering (also Engr 112)** Fall, spring. 3 credits. Limited to freshmen.

3 lecs. F. Rodriguez.  
For description see Engineering Common Courses.

**219 Mass and Energy Balances (also Engr 219)**

Fall. 3 credits. Prerequisite: one year of freshman chemistry or permission of instructor.

3 lecs. 1 computing session. R. G. Thorpe.  
For description see Engineering Common Courses.

**220 Mass and Energy Balances (also Engr 220)**

Summer. Not offered during academic year. 3 credits. Prerequisite: one year of freshman chemistry. Chem E 220 is intended for students who cannot take Chem E 219.

R. G. Thorpe.  
Self-paced audiovisual instruction in the material of Chem E 219. For description see Engineering Common Courses.

**311 Chemical Engineering Thermodynamics I**

Fall. 3 credits.  
3 lecs, 1 computing session. W. B. Streett.  
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.

**312 Chemical Engineering Thermodynamics II**

Spring. 3 credits.  
3 lecs, 1 computing session. K. E. Gubbins.  
Thermodynamics of mixtures; phase equilibria and phase diagrams. Estimation methods. Heat effects, chemical equilibria.

**410 Reaction Kinetics and Reactor Design** Fall.

3 credits. Prerequisites: Chem E 312 and 430.  
3 lecs. J. F. Cocchetto.  
A study of chemical reaction kinetics and principles of reactor design for chemical processes.

**430 Introduction to Rate Processes** Fall. 3

credits. Prerequisites: Chem E 219 and engineering mathematics sequence.  
3 lecs, 1 computing session. W. L. Olbricht.  
Fundamentals of fluid mechanics and heat transfer; solutions to problems involving viscous flow, heat conduction and convection, friction factors and heat-transfer coefficients, macroscopic balances, elementary applications.

**431 Analysis of Separation Processes** Spring. 4

credits. Prerequisites: Chem E 430 and familiarity with FORTRAN or PL/1.  
3 lecs, 1 computing session. R. G. Thorpe.

Analysis of separation processes involving phase equilibria and rate of mass transfer; some use of the digital computer. Phase equilibria; binary, multi-component, and extractive distillation; liquid-liquid extraction; gas absorption; crystallization.

**432 Chemical Engineering Laboratory** Fall. 3

credits. Prerequisites: Chem E 430, 431.  
2 lecs, 1 lab. R. L. VonBerg and staff.  
Laboratory experiments in fluid dynamics, heat and mass transfer, other operations. Correlation and interpretation of data. Technical report writing.

**433 Project Laboratory** Fall, spring. Credit vari-

able. Prerequisite: Chem E 432.  
Special laboratory projects involving bench-scale or pilot-plant equipment.

**434 Transport Phenomena** Spring. 3 credits.

Strongly recommended for those interested in graduate study in chemical engineering.  
3 lecs. W. L. Olbricht.  
An introduction to momentum, heat, and mass transport. Development of governing equations. Solutions of problems involving laminar flow of purely viscous liquids, heat transfer, and convective diffusion.

**461 Chemical Process Evaluation** Fall. 3 credits.

P. Harriott.  
Study of some important chemical processes, covering sources of raw materials, analysis of reaction conditions, and product purification.

**462 Chemical Process Synthesis** Spring. 4

credits. Prerequisite: Chem E 432.  
R. L. VonBerg and staff.  
A consideration of process and economic alternatives in selected chemical processes; design and assessment.

**463 Computer Applications in Chemical Engineering** Fall. 3 credits. Prerequisite: CS 100 or equivalent.

2 lecs, 1 computing session. P. Clancy.  
Modern computing techniques for solving current problems in chemical engineering. Basic research and applications both in industry and in the university. Computer graphics, on-line data analysis, and numerical manipulation. Extensive hands-on opportunities.

**563 Process Equipment and Design Selection**

Fall. 3 credits. Prerequisites: Chem E 430 and 431 or equivalent.  
3 lecs. J. C. Smith.

Performance, selection, and design of process equipment; storing, transporting, mixing, heating, and separating fluids and solids. Process development and decision among alternates.

**564 Design of Chemical Reactors and Multi-phase Contacting Systems** Spring. 3 credits.

3 lecs. P. Harriott.  
Design, scale-up, and optimization of chemical reactors with allowance for heat and mass transfer, nonideal flow, and catalyst aging. Selection of systems for gas-liquid contacting, including stirred tanks, fluidized beds, and fixed beds.

**565 Design Project** Spring. 3 or 6 credits. Prere-

quisites: Chem E 563, 564.  
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.

**566 Computer-aided Process Design** Spring. 3

credits. Prerequisite: concurrent registration in 462 or a previous course in process design.  
3 lecs. G. F. Scheele.  
An introduction to the synthesis and use of computer systems for steady-state simulation and optimization of chemical processes.



**595, 596 Special Projects in Chemical Engineering** Fall, spring. Credit variable.  
Research or studies on special problems in chemical engineering.

**611 Phase Equilibria** Fall. 3 credits. Prerequisite: physical chemistry.  
3 lecs. R. G. Thorpe.

A detailed study of the pressure-temperature-composition relations in binary and multicomponent heterogeneous systems in which several phases are of variable composition. Prediction of phase data.

**621 Petroleum Refining** Spring. 3 credits.

Prerequisite: Chem E 461.

3 lecs. H. F. Wiegand.

A study of processes used to refine petroleum. Recent process developments, including those for selected petrochemicals.

**623 Synthetic Fuels** Spring. 3 credits.

P. Harriott.

Energy resources and projected consumption. Gasification and liquefaction of coal and oil shale. Synthesis of methane, methanol, and hydrogen. Efficiency and economics of fuel production and use.

**640 Polymeric Materials** Fall. 3 credits.

3 lecs. F. Rodriguez.

Chemistry and physics of the formation and characterization of polymers. Principles of fabrication.

**[641 Physical Polymer Science** Fall. 3 credits.

Prerequisite: Chem E 640 or equivalent. Offered alternate years; not offered 1983-84.

3 lecs. C. Cohen.

Thermodynamic and flow properties of polymer solutions. Phase separation in mixtures. Principal characterization techniques. Viscoelastic and transport properties of bulk polymers. Models of the glass transition. Applications to selected polymer processes.]

**642 Polymeric Materials Laboratory** Spring. 2 or 3 credits. Prerequisite: Chem E 640.

F. Rodriguez.

Experiments in the formation, characterization, fabrication, and testing of polymers.

**644 Microbial Engineering** Spring. 3 credits.

Prerequisite: Chem E 410 for chemical engineering students, one year of calculus for others, or permission of instructor.

3 lecs. M. L. Shuler.

The first third of the course provides engineering students with basic background in the biological sciences and nonengineering students with basic background in chemical engineering. The remainder of the course is devoted to topics in biochemical engineering, including enzyme processes, mathematical models of cell growth, bioreactors, sterilization, and the potential uses of tissue cultures and genetically modified organisms.

**646 Controlled Cultivation of Microbial Cells**

Spring. Variable credit. Prerequisite: Microbiology 291.

R. K. Finn.

A projects course. Use of batch- and continuous-stirred jars to explore the physiology of microorganisms under conditions simulating industrial practice.

**647 Wastewater Engineering in the Process Industries**

Fall. 3 credits. Prerequisites: organic and physical chemistry, Chem E 430 or equivalent.

M. L. Shuler.

Introduction to general and legal problems of pollution control, including some descriptive technology. Major emphasis, however, is on the quantitative engineering aspects of design and operation. Both biological and physical chemical methods as they apply to the treatment of strong and special wastes from the chemical and allied industries are discussed.

**648 Polymer Processes** Spring. 3 credits. Prerequisite: 640 or permission of instructor.

3 lecs. F. Rodriguez.

Production and applications of polymers. Discussion

of stabilization and degradation, including processes for recycling and disposal of plastics and related products.

**651 Numerical Methods in Chemical Engineering**

Fall. 3 credits.

3 lecs. G. F. Scheele.

Solution of single and sets of algebraic equations, polynomial approximations, integration, initial and boundary-value ordinary differential equations, partial differential equations, statistical design of experiments.

**661 Air Pollution Control** Fall. 3 credits.

P. Harriott.

Origin of air pollutants, photochemical reactions in the atmosphere. Design of equipment for removal of particulate and gaseous pollutants formed in combustion and chemical processing.

**671 Process Control** Spring. 3 credits. Prerequisites: Chem E 410 and 430.

3 lecs. J. F. Cocchetto.

Analysis of process dynamics and design of control systems that will maintain output specifications in spite of input disturbances.

**672 Process Control Laboratory** Spring. 1 credit.

Prerequisite: concurrent registration in Chem E 671.

1 lab. J. F. Cocchetto.

Experiments on controller calibration, dynamics of first- and second-order systems, and dynamics and control of actual or simulated process systems.

**673 Adsorption and Catalysis** Spring. 2 credits.

R. P. Merrill.

The physics and chemistry of adsorption on reactive surfaces and catalysis. Emphasis on the use of modern spectroscopic techniques to determine the geometric structure, electronic structure, and reaction sequences on well-defined surfaces. Discussion of several catalytic systems.

**692, 693, 694 Research Project** Fall, spring. 3 credits; additional credit by special permission.

Prerequisite: Chem E 430.

Research on an original problem in chemical engineering.

**711 Advanced Chemical Engineering Thermodynamics**

Fall. 3 credits. Prerequisite: Chem E 312 or equivalent.

3 lecs. K. E. Gubbins.

Application of general thermodynamic methods to advanced problems in chemical engineering. Evaluation, estimation, and correlation of properties; chemical and phase equilibrium.

**713 Applied Chemical Kinetics** Fall. 3 credits.

Prerequisite: physical chemistry.

R. P. Merrill.

Fundamentals of the kinetics of reacting systems. Collision theory, unimolecular rate theory, transition-state theory, and the use of simple statistical models to represent reacting chemical systems are stressed. The application of these concepts to nonideal environments, solvent effects, and reactions on solids is presented with some emphasis on catalytic phenomena.

**731 Advanced Transport Phenomena** Spring. 3 credits. Prerequisite: Chem E 434 or equivalent.

3 lecs. P. H. Steen.

Viscous laminar flow of Newtonian fluids. Solutions of the Navier-Stokes equations for selected steady- and unsteady-state problems. An integrated presentation of momentum, mass, and heat transfer. Models of mass and heat transfer.

**751 Mathematical Methods of Chemical Engineering Analysis** Fall. 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.

**772 Theory of Molecular Liquids** Spring. 3 credits. Prerequisite: Chem E 711 or equivalent.

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.

**790 Seminar** Fall and spring. 1 credit each term.

General chemical engineering seminar required of all graduate students in the Field of Chemical Engineering.

**792 Advanced Seminar in Thermodynamics**

Fall, spring. 1 credit.

K. E. Gubbins.

A forum for talks by graduate students and faculty members on topics of current interest in thermodynamics and statistical mechanics.

**891, 892, 893 Thesis Research** Fall, spring

Thesis research for the M.S. degree in chemical engineering.

**991, 992, 993, 994, 995 Thesis Research** Fall,

spring.

Thesis research for the Ph.D. degree in chemical engineering.

## Civil and Environmental Engineering

### General

**113 Computer-aided Design in Environmental Systems (also Engr 113)** Fall. 3 credits

3 lecs.

For description see Engineering Common Courses.

**116 Modern Structures: Behavior, Design, and Construction (also Engr 116)** Spring. 3 credits.

2 lecs. A. R. Inghraff, F. H. Kulhawy, W. McGuire. For description see Engineering Common Courses.

**301 Numerical Solutions to Civil Engineering Problems** Fall. 3 credits.

Introduction to numerical and computer methods through consideration of typical problems drawn from a number of disciplines within civil and environmental engineering. Topics include computer use, computer programming, data handling, numerical analysis, and the role of computing in the civil engineering profession.

**[304 Uncertainty Analysis in Engineering** Fall. 4 credits. Prerequisite: first-year calculus. Not offered 1983-84.

Staff.

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 some nonparametric statistics and decision theory. 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.]

**305 Surveying for CEE Facilities** Fall (spring, on demand). 3 credits. Prerequisites: Mathematics 192 and a course involving physical measurements.

Recommended: Engr 260 or 270.

2 lecs, 1 lab, evening tests. G. B. Lyon.

Design and application of measurement systems and procedures for surveying for civil and environmental engineering facilities. Use of topographic maps and

other results of surveying for the physical location of civil and environmental engineering facilities. Major topics: measurement and data-reduction procedures for determination of positions; development and application of quality-control criteria for surveying measurements; compilation of topographic maps from data bases acquired by terrestrial and photogrammetric methods; use of topographic maps in planning and design of highways; surveying for construction.

**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).

**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.

**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 between the physical, social, economic, and ethical constraints on engineering design.

**601 Numerical Solutions to Civil Engineering Problems** Fall. 3 credits.

Introduction to numerical and computer methods through consideration of typical problems drawn from a number of disciplines within civil and environmental engineering. Topics include computer use, computer programming, data handling, numerical analysis at the graduate level, and the role of computing in the civil engineering profession.

**602 Boundary Surveys** Fall. 3 credits. Prerequisite: an introductory surveying course or permission of instructor.

3 lecs. G. B. Lyon. Legal principles governing the physical location of property boundaries. Historical development and methods of original surveys. Coordinate systems, retracement surveys, and restoration of property corners. Evidence of encroachment and adverse possession. Shifting boundaries.

**603 Photogrammetry** Spring. 3 credits. Prerequisite: an introductory course in surveying or permission of instructor.

2 lecs, 1 lab. G. B. Lyon. Aerial and terrestrial photogrammetry. Photograph geometry. Tilt and relief displacements. Parallax. Control requirements and flight planning. Relative and absolute orientation of stereo models. Colinearity and coplanarity conditions. Balplex and other stereoplotters.

**701 Environmental Engineering Department Seminar** Fall and spring. 1 credit.

Staff. Presentation of topics of current interest in environmental engineering.

## Remote Sensing

**610 Remote Sensing: Fundamentals** Fall. 3 credits. Prerequisite: permission of instructor.

2 lecs, 1 lab. W. R. Philipson. Fundamentals of sensing earth resources with sensors of electromagnetic radiation. Coverage includes sensors, sensor and ground-data acquisition, data analysis and interpretation, and project design.

**611 Remote Sensing: Environmental Applications** Spring. 3 credits. Prerequisite: permission of instructor.

2 lecs, 1 lab. W. R. Philipson. Applications of remote sensing in various environmental disciplines. Emphasis is on the use of aircraft and satellite imagery for studying surface features in engineering, planning, agriculture, and natural resource assessments.

**612 Physical Environment Evaluation** Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1983-84.

2 lecs, 1 lab. T. Liang. 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.]

**613 Image Analysis I: Landforms** Fall. 3 credits. Prerequisite: permission of instructor.

2 lecs, 1 lab. T. Liang. Analysis and interpretation of aerial photographs for a broad spectrum of soil, rock, and drainage conditions. Specific fields of application are emphasized.

**614 Image Analysis II: Physical Environments** Fall. 3 credits. Prerequisite: CEE 612 or 613.

2 lecs, 1 lab. T. Liang. Study of physical environments using aerial photographs and other remote sensing methods. Conventional photography; spectral, space, and sequential photography; thermal and radar imageries. Arctic, tropic, arid, and humid climate regions. Project applications.

**616 Project—Remote Sensing** On demand. 1-6 credits.

Staff. Students may elect to undertake a project in remote sensing and environmental evaluation. The work is supervised by a professor in this subject area.

**617 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.

**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.

**619 Seminar In Remote Sensing** Spring. 1 credit. S-U grades only.

W. R. Philipson. Presentation and discussion of current research, developments, and applications in remote sensing. Lectures by Cornell staff and invited specialists from government, industry, and other institutions.

**610 Thesis—Remote Sensing** Fall and 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.

## Public and Environmental Systems Engineering

**321 Microeconomic Analysis (also Economics 313)** Fall. 4 credits. Prerequisite: one year of college-level mathematics. A liberal elective for engineers.

R. E. Schuler.

Intermediate microeconomic analysis similar to Economics 311 but emphasizing mathematical techniques and engineering-design implications. Theory of households, firms, monopoly and competitive markets, distribution and equilibrium welfare economics.

**322 Economic Analysis of Government (also Economics 308)** Spring. 4 credits. Prerequisites: one year of college-level mathematics, plus CEE 321 or Economics 313. A liberal elective for engineers.

R. E. Schuler. Analysis of government intervention in a market economy and implications for engineering planning and design. Public goods, public finance, cost-benefit analysis, environmental regulation, choice under uncertainty and risk management, and macroeconomic topics.

**323 Engineering Economics and Management** 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 estimate costs and 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 discussed.

**325 Social Implications of Technology** Fall. 3 credits. Approved liberal elective; not open to freshmen.

W. R. Lynn. Examines selected issues pertaining to the development, implementation, and assessment of technology. Special emphasis is given to social, political, and economic aspects of current problems that have important technological components.

**[426 Seminar In Technology Assessment]**

Spring. 3 credits. Open to graduate students and upperclass undergraduates. Not offered 1983-84.

N. Orloff. An interdisciplinary seminar dealing with the social consequences of technological developments, and means by which technology can be guided in socially beneficial directions.]

**[624 Legal Process]** Spring. 3 credits. Limited to graduate students and upperclass undergraduates. Not offered 1983-84.

N. Orloff. An introduction to the structure and operation of our legal system. Development of legal skills and the ability to do one's own basic legal research.]

**625 Environmental Law I (also Toxicology 625)** Fall. 4 credits. Limited to graduate students and seniors; other undergraduates with permission of instructor.

N. Orloff. 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; the regulations issued to implement them; and the important judicial decisions that have been handed down under each.

**626 Environmental Law II** Spring. 3 credits. Limited to graduate students and seniors; other undergraduates with permission of instructor. Recommended: CEE 625 or equivalent.

N. Orloff. Analysis of additional components of environmental law, such as those pertaining to toxic substances, hazardous wastes, and management of public lands.

**627 Regulation of Toxic Substances (also Toxicology 627)** Spring. 3 credits. Limited to graduate students and seniors. Recommended: CEE 625 or equivalent.

N. Orloff.

Analysis of the legal doctrines and the scientific tools used by federal agencies to make decisions regarding human exposure to toxic substances. The programs of EPA, FDA, CPSC, and OSHA are examined.

**628 Environmental Systems Analysis** Spring. 3 credits. Prerequisite: CEE 323 or an introductory optimization course.

C. A. Shoemaker.

Use of systems analysis in engineering design for solutions to public-sector and environmental problems. Applications to water-resource, energy-production, and facility-location problems.

**629 Environmental and Water Resources Systems Analysis Colloquium** Fall, spring. 1 credit.

Staff.

Lectures in various topics related to environmental or water-resources systems planning and analysis.

**721 Environmental and Water Resources Systems Analysis Design Project** On demand. Credit variable. Prerequisite: permission of instructor. May extend over two semesters.

Staff.

Design or feasibility study of environmental or water resources systems, supervised and assisted by one or more faculty advisers; individual or group participation. Final report required.

**722 Environmental and Water Resources Systems Analysis Research** On demand. Credit variable. Prerequisite: permission of instructor. Preparation must be suitable to the investigation to be undertaken.

Investigations of particular environmental or water resources systems problems.

**729 Special Topics In Environmental or Water Resources Systems Analysis** On demand. Credit variable.

Staff.

Supervised study, by individuals or small groups, of one or more specialized topics not covered in regular courses.

## Fluid Mechanics and Hydrology

**331 Fluid Mechanics** Fall. 4 credits. Prerequisite: Engr 203 (may be taken concurrently).

3 lecs, 1 rec. Evening exams. Staff.

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.

**332 Hydraulic Engineering** Spring. 3 credits. Prerequisite: CEE 331.

2 lecs, 1 lab, field trips. 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.

**[430 Descriptive Hydrology** Spring. 2 credits. Intended for non-engineering majors. Prerequisite: permission of instructor. Not offered 1983-84.

W. H. Brutsaert.

Introduction to hydrology as a description of the hydrologic cycle and the role of water in the natural environment. Topics include precipitation, infiltration, evaporation, groundwater, surface runoff, floods, and droughts.]

**630 Advanced Fluid Mechanics** Fall. 3 credits. Prerequisite: CEE 331

3 lecs, P. L.-F. Liu.

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.

**[631 Dynamic Oceanography** Fall. 3 credits.

Prerequisite: CEE 331. Not offered 1983-84.

P. L.-F. Liu.

The statics and dynamics of oceans and lakes. Currents in homogeneous and stratified bodies of water; tidal motions; waves in a stratified ocean.]

**[632 Analytical Hydrology** Fall. 3 credits.

Prerequisite: CEE 331. Not offered 1983-84.

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.]

**[633 Flow in Porous Media and Ground Water** Spring. 3 credits. Prerequisite: CEE 331. Not offered 1983-84.

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; sea-water intrusion, miscible displacement; transient seepage in unsaturated materials.]

**[634 Engineering Micrometeorology** Spring. 3 credits. Prerequisite: CEE 331. Not offered 1983-84.

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.]

**635 Coastal Engineering I** Spring. 3 credits.

Prerequisite: CEE 331.

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.

**[636 Environmental Fluid Mechanics I** Fall. 3 credits. Prerequisite: CEE 331. Not offered 1983-84.

3 lecs. G. H. Jirka.

Introduction to mass and heat-transport processes due to pollutant discharges into the environment. Turbulent diffusion equation and its solution for instantaneous and continuous releases. Concept of longitudinal dispersion in shear flow. Applications to pollutant-transport prediction in lakes, rivers, estuaries, and coastal zones, as well as the atmosphere. Relative role of hydrodynamic transport to reaction kinetics. Exchange processes for mass and heat at the air-water interface. Convective transport due to density currents. Jet mixing and the design of outfall structures.]

**637 Project—Hydraulics** On demand. Variable credit.

Hours to be arranged. Staff.

The student may elect a design problem or undertake the design and construction of special equipment in the fields of fluid mechanics, hydraulic engineering, or hydrology.

**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.

**639 Special Topics in Hydraulics** On demand. Credit variable.

Staff.

Special topics in fluid mechanics, hydraulic engineering, or hydrology.

**730 Coastal Engineering II** Fall. 3 credits.

Prerequisite: CEE 635.

3 lecs. P. L.-F. Liu.

Review of gravity wave theories, applicability of different wave theories to engineering problems, wave-energy transmission, tsunamis, boundary-value problems in wave hydrodynamics, behavior of submerged and floating bodies, harbor agitations, ship waves.

**[731 Environmental Fluid Mechanics II** Spring. 3 credits. Prerequisite: CEE 636 or permission of instructor. Offered alternate years. Not offered 1983-84.

3 lecs. G. H. Jirka.

Mechanics of discretely and continuously stratified fluids: internal waves, density currents, blocking, selective withdrawal, and internal jumps. Interfacial stability and mixing. Observed characteristics of turbulent fluid flow in environmental applications, including interaction with buoyancy. Integral techniques for self-similar flows: jets, plumes, and mixing layers. Experimental approaches to environmental fluid problems.]

**[732 Unsteady Hydraulics** Spring. 3 credits. Prerequisite: CEE 332 or permission of instructor. Offered alternate years. Not offered 1983-84.

J. A. Liggett.

The physical and mathematical basis for unsteady processes in hydraulic engineering, especially unsteady open-channel flow. Water hammer, unsteady sediment transport, long waves on large bodies of water, circulation. Numerical methods of solution.]

**[733 Environmental Planning and Operation of Energy Facilities** Spring. 3 credits. Prerequisites: CEE 636 or equivalent. Not offered 1983-84.

G. H. Jirka.

Survey of analytical methodologies for predicting and controlling the environmental impacts of individual energy facilities or of energy systems, presented in a mixed lecture and seminar format. Estimation of construction and operating impacts: pollutant sources, models for pollutant dispersal, modeling the relationships of pollutant concentration and ecological, health, and socioeconomic damages. Pollutant-abatement strategies and transient-release techniques. Models for regional energy-facility siting.]

**[734 Experimental Methods in Hydraulics** On demand. 2 credits. Prerequisite: CEE 331. Not offered 1983-84.

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.]

**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.

## Geotechnical Engineering

**341 Introductory Soil Mechanics** Spring. 3 credits.

2 lecs, 1 lab-tutorial. T. D. O'Rourke.

Soil as an engineering material. Chemical and physical nature of soil. Engineering properties of soil. Stresses and stress analysis in soil. Introduction to slope stability and earth pressure. Introduction to laboratory testing. Synthesis of soil analysis and laboratory-test results for the design of engineering structures.

**640 Foundation Engineering** Fall. 3 credits  
Prerequisite: CEE 341.

3 lecs, optional tutorial. F. H. Kulhawy.  
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.

**641 Retaining Structures and Slopes** Spring 3 credits. Prerequisite: CEE 341.

3 lecs, optional tutorial. T. D. O'Rourke.  
Earth pressure theories. Design of rigid, flexible, braced, tied-back, slurry, and reinforced earth walls. Stability of excavation, cut, and natural slopes. Design problems stressing application of course material under field conditions of engineering practice.

**642 Highway Engineering (also Ag En 491)** Spring. 3 credits. Prerequisites: Junior standing in engineering, fluid mechanics, and soil mechanics (may be taken concurrently). Offered alternate years.

2 lecs, 1 lab. L. H. Irwin.  
See Ag En 491 for course description.

**[643 Highway Materials and Pavement Design (also Ag En 692)]** Fall. 4 credits. Limited to engineering seniors and graduate students. Prerequisites: CEE 341 and 642. Offered alternate years; not offered 1983-84.

3 lecs, 1 lab. L. H. Irwin.  
See Ag En 692 for course description.]

**647 Design Project in Geotechnical Engineering** On demand. 1-6 credits.

Students may elect to undertake a design project in geotechnical engineering. The work is supervised by a professor in the subject area.

**648 Seminar in Geotechnical Engineering** Fall, spring.  
Staff.

Presentation and discussion of topics in current research and practice in geotechnical engineering.

**649 Special Topics in Geotechnical Engineering** On demand. 1-6 credits.  
Staff.

Supervised study of special topics not covered in the formal courses.

**740 Engineering Behavior of Soils** Fall. 3 credits  
Prerequisite: CEE 341.

3 lecs. I. Ishibashi.  
Detailed study of physiochemical nature of soil. Stress states and stress-strain-time behavior. In-depth evaluation of the strength, compressibility, and permeability of natural soils. Study of special deposits such as sensitive, organic, frozen, and man-made soils.

**741 Rock Engineering** Fall. 3 credits.  
Prerequisite: CEE 341 or permission of instructor. Recommended: introductory geology.

2 lecs, 1 lab. F. H. Kulhawy.  
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.

**742 Graduate Soil Mechanics Laboratory** Fall. 3 credits. Prerequisite: CEE 740.  
I. Ishibashi.

Laboratory measurement of soil properties, from introductory to advanced techniques. Emphasis on strength, compressibility, permeability tests. Critical evaluation of laboratory methodology. Design applications of laboratory-test results.

**[744 Advanced Foundation Engineering** Spring 3 credits. Prerequisite: CEE 640. Not offered 1983-84.  
3 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.]

**745 Soil Dynamics** Spring. 3 credits. Prerequisite: permission of instructor.

3 lecs. I. Ishibashi.  
Study of soil behavior under dynamic loadings. Laboratory and field techniques for determining dynamic soil properties, strength of liquefaction. Design examples of foundations and embankments.

**746 Embankment Dam Engineering** Spring 2 credits. Prerequisites: CEE 641 and 741, or permission of instructor.

2 lecs. F. H. Kulhawy.  
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.

**[747 Case Studies in Geotechnical Engineering** Spring. 3 credits. Prerequisites: CEE 641 and 741. Not offered 1983-84.

Staff.  
Study of case histories in geotechnical engineering. Critical evaluation of successful and unsuccessful projects. Oral presentations and engineering report evaluation of each case.]

**[748 Tunnel Engineering** Spring. 2 credits. Prerequisites: CEE 641 and 741. Not offered 1983-84.

2 lecs. F. H. Kulhawy, T. D. O'Rourke.  
Principles of analysis and design for earth and rock tunnels. Materials, construction methods, stability and support systems, deformations, and performance monitoring.]

**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.

## Environmental Quality Engineering

**351 Environmental Quality Engineering** Spring. 3 credits.

3 lecs. L. W. Lion.  
Introduction to engineering aspects of environmental quality control. 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.

**352 Water Supply Engineering** Fall. 3 credits. Prerequisite: CEE 351 or permission of instructor.

3 lecs. J. J. Bisogni.  
Analysis of contemporary threats to human health in public water-supply systems. Criteria and standards for the quality of potable water. Water-quality control theory. Design of facilities for obtaining, treating, storing, and distributing water

**651 Microbiology of Water and Wastewater** Fall 2 credits. Prerequisite: one semester of college chemistry.  
J. M. Gossett.

Microbiological phenomena pertinent to analysis of natural systems and design of engineered microbial processes in pollution control.

**652 Assimilation of Pollutants in Natural Systems** Spring. 3 credits. Prerequisite: CEE 351 or permission of instructor.

3 lecs. J. J. Bisogni.  
Assimilation and transport of pollutants in nature. Emphasis on the physics, chemistry, and biology that form the basis for mathematical description of the assimilation phenomenon in natural systems.

**653 Chemistry of Water and Wastewater** Fall. 3 credits. Prerequisite: one semester of college chemistry or permission of instructor.

3 lec-recs. J. M. Gossett.  
Principles of chemistry applicable to the understanding, design, and control of water and wastewater treatment processes and to reactions in receiving waters.

**654 Aquatic Chemistry** Spring. 3 credits. Prerequisite: CEE 653 or Chemistry 287-288.

3 lecs. L. W. Lion.  
Development of fundamental concepts of chemical equilibria and application to natural aquatic systems as well as to water and wastewater treatment systems. Topics include chemical thermodynamics, acid-base reactions, oxidation-reduction, coordination chemistry, biologically mediated reactions, and interfacial phenomena. Emphasis is placed on phenomena, mathematical solution of chemical equilibria, and their application to the prediction and management of water quality.

**655 Industrial Waste Management** Spring. 3 credits. Prerequisites: CEE 351 and 653 or permission of instructor.

3 lec-discs. R. C. Loehr.  
An analysis of the treatment and disposal of industrial wastes, primarily wastewaters. Regulatory and legal aspects; pretreatment; treatment and disposal processes for conventional, nonconventional, and toxic pollutants; industrial-waste survey; case studies of specific industries; opportunities for recycling and reuse. Emphasis is on an understanding of the constraints on industrial-waste discharges and the processes and approaches to meet those constraints.

**656 Environmental Quality Management** Fall; spring on demand. 3 credits (4 with approval of instructor). For upperclass or graduate students. May not be offered 1983-84.

2 lec-discs. L. B. Dworsky.  
An introduction to environmental quality management; nature, cause, and control of environmental problems; interaction of physical, social, and cultural environments. Emphasis on the interdependent social, economic, developmental, and environmental issues confronting society.

**658 Sludge Treatment, Utilization, and Disposal** Spring. 3 credits. Prerequisite: CEE 351 or permission of instructor.

3 lecs. R. I. Dick.  
An analysis of the quantity and quality of residues produced from municipal and industrial water-supply and pollution-control facilities as a function of process design and operational variables; the alternatives for reclamation or ultimate disposal of residues with assessment of potential environmental impacts and factors influencing the magnitude of those impacts; the fundamental factors influencing performance of treatment processes for altering sludge properties prior to ultimate disposal; and considerations in selection and integration of sludge-management processes to approach optimal design.

**659 Environmental Quality Engineering Seminar** Fall, spring. 1 credit. Open to undergraduates with permission of instructor. Presentation and discussion of current topics and problems in sanitary engineering and environmental quality engineering.

**752 Water Quality Laboratory** Fall, 1 credit. Enrollment limited. Prerequisites: CEE 653 (or concurrent enrollment) and permission of instructor.

J. M. Gossett.  
Laboratory methods for analysis of pollutants in water and wastewater.

**755 Environmental Engineering Processes I**

Fall, 3 credits (4 with lab). Prerequisite: CEE 653 or permission of instructor.

3 lecs, 1 lab. L. W. Lion.  
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. Pertinent laboratory studies.

**756 Environmental Engineering Processes II**

Spring, 3 credits (4 with lab). Prerequisite: CEE 755 or permission of instructor.

3 lecs, 1 lab. 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. Pertinent laboratory studies.

**757 Design Project in Environmental Engineering**

On demand. Variable credit. Prerequisite: CEE 351 or equivalent.

Staff.  
The student chooses or is assigned a problem in the design of water or wastewater treatment, pollution-control facilities, or a laboratory project.

**758 Environmental Engineering Research**

On demand. Variable credit. Prerequisites will depend on the particular investigation to be undertaken.

Staff.  
For the student who wants to study a problem in greater depth than is possible in formal courses. Study may be any combination of literature, laboratory, or computational research.

**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.

**851 Thesis—Environmental Engineering** Fall and 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

**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. Vehicle and system technology; traffic flow and control; terminal operations; supply-demand interactions; system planning, design, and management; and institutional issues.

**660 Urban Transportation Planning**

Fall, 4 credits.  
G. P. Fisher.  
The problem of urban transportation; its roots, manifestations, and implications; the systems-analysis approach to transportation; supply and demand in the design and implementation of transportation systems; modeling components in the process of planning urban transportation; generation and evaluation of alternatives; modern practice of urban-transportation planning. A laboratory period is

designed for team-study projects using computerized planning-system packages.

**661 Travel Demand Theory and Applications**

Spring, 3 credits. Prerequisite: CEE 660 or permission of instructor.

A. H. Meyburg.  
New methods for estimating and predicting travel demand. Treatment of the individual as an economic and psychological decision-making unit. Theoretical background of the models, empirical estimation, measurement of attributes, and need for appropriately designed transportation facilities and operations. Practical problems and directions of present and future research. Issues of survey-sample design.

**663 Transportation Systems Analysis**

Fall, 3 credits. Prerequisites: CEE 361 and OR&IE 320, or permission of instructor.

M. A. Turnquist.  
Application of operations-research and systems-analysis techniques to transportation systems, both passenger and freight. Network flows. Design of networks, routes, and schedules. Terminal operation and design.

**664 Transportation Systems Design**

Spring, 3 credits.  
G. P. Fisher.  
Advanced techniques for design of transportation systems, including terminals and networks. Evaluation of alternative designs. Management and operation of transportation systems.

**666 Transportation Economics**

Spring, 3 credits. Prerequisite: CEE 321 or equivalent.

M. A. Turnquist.  
Economic analysis of freight and passenger transportation systems. Pricing and regulation. Elements of cost-benefit analysis and evaluation of public investment and subsidy. Consideration of national transportation policy.

**668 Operations, Design, and Planning of Public Transportation Systems**

Spring, 3 credits. Recommended: CEE 361 or CEE 660, or permission of instructor.

M. A. Turnquist.  
Financing and organization of mass transportation. Design of route networks. Scheduling of services. Use of computer-aided design methods. Fare policy and planning for provision of integrated services. The role of innovative technology.

**[669 Freight Transportation]**

Spring, 3 credits. Recommended: CEE 361 or CEE 660. Not offered 1983–84.  
G. P. Fisher.  
Transportation-planning methodology for interurban and intraurban freight movements. Relationship to the urban transportation-planning process. Facilities design. Problem identification, solution strategies, analysis techniques. Freight demand analysis. Alternative technologies in view of energy, efficiency, and environmental impacts. Economic regulation }

**761 Transportation Design Project**

On demand. Variable credit. Staff.  
Design or feasibility study of transportation systems, supervised by one or more faculty advisers. Individual or group participation.

**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.

**763 Transportation Colloquium**

Fall, spring, 1 credit.  
Lectures in various topics related to transportation planning and analysis.

**764 Special Topics in Transportation**

Fall, spring. Variable credit. Staff.  
Consideration of subject matter not covered in depth in regular courses. Topics vary from year to year but may include such topics as terminal operations, airport planning and design, traffic-flow theory, marine transportation.

## Structural Engineering

**371 Structural Behavior**

Fall, 4 credits. Prerequisite: Engr 202.  
3 lecs, one 2-hour lab. Evening exams. R. N. White.  
Fundamental concepts of structural engineering. Behavior, analysis, design, structural planning. Loads, structural form, statically determinate analysis, approximate analysis of indeterminate systems. Fundamentals of behavior and design of steel and concrete members.

**372 Structural Analysis**

Spring, 4 credits. Prerequisite: CEE 371.  
3 lecs, one 2-hour lab. Evening exams. J. F. Abel.  
Fundamentals of statically indeterminate structures. Moment-area and virtual-work methods of displacement computation. Matrix force and stiffness methods. Moment distribution analysis. Influence lines. Computer applications to practical structures.

**373 Structural Design**

Fall, 4 credits. Prerequisites: CEE 372 or permission of instructor; CEE 376 and Engr 261 are also required but may be taken concurrently.  
Evening exams. T. Pekoz.  
Continues the study of the behavior and design of steel and concrete members and structures. Structural elements, connections, and systems. Plastic analysis of steel frames.

**374 Structural Design Project**

Spring, 4 credits. Prerequisite: CEE 373. Staff.  
Intended to develop an understanding of the structural design process. Comprehensive design project. Lectures on preliminary design; composite construction; prestressed concrete; various structural systems such as bridges, roofs, and tall buildings; seismic design.

**375 Structural Behavior Laboratory**

Spring, 2 credits. Prerequisite or corequisite: CEE 372. R. N. White.  
A laboratory course on behavior of structures, utilizing small-scale models. Elastic, inelastic, and nonlinear behavior of structural components and systems. Experimental design and projects.

**376 Civil Engineering Materials**

Fall, 3 credits. 2 lecs, 1 lab. F. O. Slate.  
Engineering properties of concrete, steel, wood, and other structural materials. Design characteristics and significance of test results of materials used in engineering works. Extensive laboratory testing and report writing.

**670 Timber Engineering**

Spring, 1 credit. Prerequisite: CEE 373. R. N. White.  
Timber properties. Design of timber tension members, beams, and beam-columns. Glued-laminated timber design. Connection behavior and design. Special timber structural systems.

**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, inelastic stress-strain relationships, stress concentration, introduction to fracture, fatigue.

**673 Advanced Structural Analysis**

Fall, 3 credits. Prerequisites: CEE 372 and computer programming.

Staff.



Direct stiffness and flexibility methods in matrix formulation, use of standard analysis programs, error detection, substructuring, and special analysis procedures.

**[674 Structural Model Analysis and Experimental Methods]** Fall. 3 credits. Not offered 1983-84  
2 lecs, 1 lab. R. N. White.

Dimensional analysis and similitude. Model materials, fabrication, loading, instrumentation techniques, and use of design. Experimental stress analysis.]

**675 Advanced Plain Concrete** Spring. 3 credits  
Prerequisite: CEE 367 or equivalent.

2 lecs, conferences. F. O. Slate.  
Topics such as history of cementing materials, air entrainment, light-weight aggregates, petrography, durability, chemical reactions, properties of aggregates, and construction. Relationships among internal structure and physical, chemical, and mechanical properties.

**676 Structure and Properties of Materials**

Spring. 3 credits. Limited to graduate students in engineering or physical sciences, or undergraduates by permission of instructor. Offered alternate years.

2 lecs, conferences. F. O. Slate.  
Internal structure from amorphous to crystalline state. Forces holding matter together versus forces causing deformation and failure. Correlation of internal structures with physical and mechanical properties. Applications to various engineering materials.

**678 Low-Cost Housing Primarily for Developing Nations** Spring. 3 credits. Offered alternate years.

2 lecs, conferences. F. O. Slate.  
A multidisciplinary course. Students work intensively, usually in their own discipline, for a term project while also being introduced to problems and approaches of other disciplines. Engineers investigate the technological aspects of the subject and other aspects that influence technological decisions, such as cultural and economic factors.

**679 Low-Cost Housing for Developing Nations—Workshops for Physical Planning, Site Selection, and Design** Spring. A mixed class of advanced civil engineering and architecture students. Offered alternate years.

F. O. Slate.  
Discussions and workshops on physical planning, site selection, choice of materials, and detailed design of individual structures and groupings.

**680 Structural Engineering Seminar** Fall and spring. 1 credit. Limited to qualified seniors and graduate students.

Staff.  
Presentation of topics of current interest in the field of structures.

**[770 Engineering Fracture Mechanics]** Spring 3 credits. Prerequisite: CEE 772 or permission of instructor. Offered alternate years. Not offered 1983-84.

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. Laboratory techniques for fracture toughness testing of metals, concrete, and rock.]

**771 Structural Stability: Theory and Design** Spring. 3 credits.

Staff.  
Analysis of elastic and plastic stability. Determination of buckling loads and postbuckling behavior of columns. Solid and open web columns with variable cross section. Beam columns. Frame buckling. Torsional-flexural buckling. Lateral buckling of beams. Buckling loads and postbuckling behavior of plates, shear webs, and shells. Critical discussion of current design specification.

**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.

**773 Structural Reliability** Spring. 3 credits  
Prerequisite: CEE 373.

M. D. Grigoriu.  
Review of probability theory, practical measures for structural reliability, second-moment reliability indices, probability models for strength and loads, load combinations, probability-based design codes, reliability of structural systems with applications, introduction to random vibration, applications to wind and seismic design.

**774 Prestressed Concrete Structures** Spring 3 credits. Prerequisite: CEE 373. Recommended: CEE 374

3 lecs. A. H. Nilson.  
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 and compression members, frameworks, bridges.

**775 Advanced Reinforced Concrete** Fall. 3 credits. Prerequisite: CEE 373. Recommended: CEE 374.

3 lecs. A. H. Nilson.  
General flexural analysis, deflection analysis, columns with uniaxial and biaxial bending, beam-supported slabs, flat-plate slabs, composite steel-deck slabs, ground-supported slabs, yield line theory, limit state analysis, footings, retaining walls, deep beams, tall buildings, and seismic design.

**776 Advanced Design of Metal Structures** Fall. 3 credits. Prerequisite: CEE 373.

W. McGuire.  
Behavior and design, with emphasis on connections, torsion of steel members, columns, and beam columns.

**777 Advanced Behavior of Metal Structures** Spring. 3 credits. Prerequisite: CEE 373.

W. McGuire.  
Behavior and design of tall-building systems. Cold-formed steel. Fatigue.

**778 Shell Theory and Design** Spring. 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.

**779 Structural Design for Dynamic Loads** Spring. 3 credits.

P. Gergely.  
Modal analysis, numerical methods, and frequency-domain analysis. Introduction to earthquake-resistant design.

**[780 Optimum Structural Design]** Fall. 3 credits. Offered alternate years. Not offered 1983-84.

Design of structures for minimum weight or cost. Includes full-stressed design, classical minimization procedures, and mathematical programming methods.]

**[781 Numerical Methods in Structural Engineering]** Fall. 3 credits. Prerequisites: CEE 672 and 673. Offered alternate years. Not offered 1983-84.

J. F. Abel.  
Numerical techniques for structural and geotechnical engineering, such as residual, variational, finite-difference, and finite-element methods. Selected numerical analysis topics and solution algorithms with emphasis on linear equations and eigenvalue problems.]

**782 Advanced Topics in Finite-Element Analysis** Fall. 3 credits. Prerequisite: 772. Offered alternate years

J. F. Abel.  
Lectures and colloquia on selected advanced topics and research in progress, including dynamics, nonlinear analysis, shells, fracture mechanics, fluid dynamics, and computer graphics.

**783 Civil and Environmental Engineering Materials Project** On demand. 1-3 credits.

F. O. Slate.  
Individual projects or reading and study assignments involving engineering materials.

**784 Design Project in Structural Engineering**

Fall, spring. Variable credit  
Students may elect to undertake a design project in structural engineering. The work is supervised by a professor in this subject area.

**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.

**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.

**880 Thesis—Structural Engineering** Fall and 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.

**Water-Resources Planning and Analysis**

**691 Water-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. L. B. Dworsky.  
Historical and contemporary perspectives on water problems. Organization and public policies.

**[692 Stochastic Hydrologic Modeling]** On demand. 2-3 credits. Prerequisite: OR&IE 370 or CEE 304. Not offered 1983-84.

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 streamflow models; drought- and flood-frequency estimation; analysis of simulation output; parameter estimation and Bayesian inference.]

**693 Water-Quality Modeling** Spring 1-3 credits  
Prerequisite: one year of calculus.

D. P. Loucks, C. A. Shoemaker.  
Development and application of predictive models for estimating the concentrations of chemical and biological constituents in bodies of surface water and groundwater. Application of existing computer-simulation and optimization models to regional water-quality-management problems.

**694 Planning 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.

**[695 Planning Water-Resources Systems II**

Spring, 3 credits. Prerequisites: CEE 304 and CEE 694 or permission of instructor. Not offered 1983-84.

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.]

## Computer Science

The Department of Computer Science is in both the College of Arts and Sciences and the College of Engineering.

**100 Introduction to Computer Programming (also Engr 105)** Fall, spring, summer, 4 credits.

Students who plan to take both CS 101 and 100 must take 101 first.

2 lecs, 1 rec (optional), 3 evening exams.

An introduction to elementary computer programming concepts. Emphasis is on techniques of problem analysis and algorithm and program development. The subject of the course is programming, not a particular programming language. The principal programming language is PL/1; FORTRAN is introduced and used for final problems. 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.

**100 Advanced Placement in Computing** Fall, 2 credits plus 2 AP credits. S-U grades only. To take this course, enroll in CS 100 or Engr 105 for 2 credits.

2 lecs, 2 evening exams.

Entering freshman and transfer students with significant previous exposure to computing can elect this advanced-placement section of CS 100, which covers essentially the same material as other sections but at an accelerated pace, so that the course is finished after the first six weeks of the fall term. The advanced-placement section provides a systematic review of programming concepts and an introduction to the modified version of PL/1 used at Cornell. Upon successful completion of the advanced placement section, students receive a grade of S for CS 100, which is worth two credits, plus two advanced placement credit in programming. Students may transfer at any time during the six weeks from the advanced-placement section to a full-term, four-credit section of the course.

**101 The Computer Age** Fall, spring, summer, 3 credits. Credit is granted for both CS 100 and 101 only if 101 is taken first.

2 lecs, 1 rec, 1 evening exam.

Introduction to computer science and programming for students in nontechnical areas. Topics 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 PL/1 programs using the Cornell Program Synthesizer. The amount of programming is about half of that taught in CS 100. Each student writes a term paper on some aspect of computing. The aims of the course are to make the student an intelligent consumer of what the computer

has to offer and to develop an appreciation of algorithmic thinking.

**211 Computers and Programming (also Engr 211)** Fall, spring, summer, 3 credits. Prerequisite: CS 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, invariant relations, block structure, recursion, introduction to data structures, and analysis of algorithms. PL/1 is the principal programming language.

**280 Discrete Structures** Fall, spring, 4 credits. Prerequisite: CS 211 or permission of instructor.

3 lecs.

Covers mathematical aspects of programming and computing. Topics will be chosen from the following: mathematical induction; logical proof; the predicate calculus; combinatorics and discrete mathematics covering manipulation of sums, recurrence relations, and generating-function techniques; recursive functions; relations; partially ordered sets.

**305 Social Issues in Computing** Fall, 3 credits. Prerequisite: CS 100 or 101, or permission of instructor.

2 lecs.

Economic, political, legal, and cultural impact of computers and computer-related technology; the role of computers in coordinating diversity and reducing disorder; the effect of computers on the individual; data banks and privacy; machine creativity and machine intelligence.

**314 Introduction to Computer Systems and Organization** Spring, summer, 4 credits.

Prerequisite: CS 211 or equivalent.

2 lecs, 1 rec, 2 evening exams.

Introduction to the logical structure of digital computers. Topics include representation of information, machine-assembly language, the input-output channel, hierarchical storage systems, and microprogramming.

**321 Numerical Methods (also Engr 321)** Fall, spring, 4 credits. Prerequisites: CS 100 and Mathematics 221 or coregistration in Mathematics 294.

3 lecs.

Students solve representative problems by programming appropriate algorithms and using library programs. Numerical methods for systems of linear equations, interpolation, integration, ordinary differential equations, nonlinear equations, optimization, and linear least squares. Some mathematical analysis of the algorithms is presented.

**410 Data Structures** Fall, summer, 4 credits. Prerequisite: CS 280 or permission of instructor.

3 lecs, 2 evening exams.

Lists, trees, graphs, arrays, and other forms of data structure and their implementation. Relationship between language and data structure. Dynamic storage allocation and memory management. Detailed study of searching and sorting methods. Analysis to determine the more efficient algorithm in a given situation.

**411 Programming Languages and Logics**

Spring, 4 credits. Prerequisites: CS 410 and permission of instructor. Enrollment limited.

2 lecs.

Introduction to the major language families with emphasis on program explanations and logics of programming. Some study of language implementations. Topics include introduction to methods of language definition, imperative languages (e.g., Pascal), object-oriented languages (Smalltalk), and applicative and functional languages (LISP, FP). Projects are assigned in Pascal and LISP.

**414 Systems Programming and Operating Systems** Fall, 3 credits. Prerequisite: CS 314 or permission of instructor.

2 lecs, 2 evening exams.

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.

**415 Practicum in Operating Systems** Fall 2 credits. Corequisite: CS 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.

**417 Interactive Computer Graphics (also Architecture 334)** Spring 4 credits. Enrollment limited for 1983-84. Requires instructor's signature. Prerequisite: CS 314.

2 lecs, 1 lab.

Introduction to the software and hardware concepts of interactive computer graphics. Topics include input methods, graphic data structures, geometric modeling, surface description methods, hidden-line/hidden-surface algorithms, image processing, color perception, and realistic image synthesis. Examples of computer-aided design applications are presented. Assignments consist of hands-on experience on storage-tube, vector-refresh, and color-raster displays. Course makes use of the Computer-Aided Design Instructional Facility.

**432 Introduction to Database Systems** Spring 4 credits. Prerequisite: CS 211 or permission of instructor.

2 lecs, 1 rec.

Introduction to modern database systems, including data models, processing and query languages, file-organization schemes, and problems associated with distributed and concurrent processing.

**481 Introduction to Theory of Computing** Fall, 4 credits. Prerequisite: CS 280 or permission of instructor.

3 lecs.

Introduction to modern theory of computing: automata theory, formal languages, and effective computability.

**482 Introduction to Analysis of Algorithms**

Spring, 4 credits. Prerequisites: CS 410 and 481 or permission of instructor.

3 lecs.

Major paradigms used in the creation and analysis of algorithms. Combinatorial algorithms, computational complexity, NP-completeness, and intractable problems.

**[484 Introduction to Symbolic Computation**

Spring, 4 credits. Prerequisites: CS 481, or Mathematics 332, or Mathematics 432, or permission of instructor. Not offered 1983-84.

2 lecs.

Topics include integer and polynomial arithmetic, algebraic simplifications, manipulation of power series, integration of rational functions, and an introduction to a symbolic computation package such as MACSYMA.]

**490 Independent Reading and Research** Fall, spring, 1-4 credits. Independent reading and research for undergraduates.

**600 Computer Science and Programming** Fall, 1 credit. Prerequisite: graduate standing in computer science or permission of instructor.

1 lec.

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.

**611 Advanced Programming Languages** Fall 4 credits. Prerequisite: CS 410 or permission of instructor.

3 lecs.  
Introduction to techniques for formal specification of programming languages and data types, including term-rewriting systems and Scott's denotational techniques; use of formal semantics in comparing and classifying languages; other advanced concepts including logic programming, functional programming, and data-flow languages.

**612 Translator Writing** Spring, 4 credits. Prerequisites: CS 410 and 481 or permission of instructor.

3 lecs.  
Discussion of the models and techniques used in the design and implementation of compilers. Topics include lexical analysis in translators, compilation of arithmetic expressions and simple statements, specifications of syntax, algorithms for syntactic analysis, code generation and optimization techniques, bootstrapping methods, and translator writing systems.

**613 Concurrent Programming and Operating Systems Principles** Spring, 4 credits. Prerequisites: CS 414 and 600 or permission of instructor.

3 lecs.  
Covers advanced techniques and models of concurrent systems. Synchronization of concurrent processes; parallel programming languages; deadlock; verification.

**614 Advanced Operating Systems** Spring, 4 credits. Prerequisite: CS 414 or permission of instructor.

2 lecs.  
An advanced course in operating systems, emphasizing contemporary research in distributed systems. Topics may include processes and file systems, virtual memory and segmentation, addressing, scheduling, performance, protection, communication mechanisms, and fault-tolerant systems.

**[615 Machine Organization]** Spring, 4 credits. Prerequisite: CS 314 or permission of instructor. Not offered 1983-84.

**621-622 Numerical Analysis** 621, fall; 622, spring, 4 credits each term. Prerequisites: CS 321 and Mathematics 411 and 431, or permission of instructor.

3 lecs.  
The analysis and implementation of algorithms for the numerical solution of basic mathematical problems. Emphasis is placed on the estimation of error, the analysis of stability, and how to design efficient and reliable numerical algorithms. The student solves representation problems by writing original programs and by making use of high-quality, state-of-the-art software. Fall term: direct methods for linear equations, interpolation, least-squares and polynomial approximation, nonlinear equations, and optimization. Spring term: quadrature, ordinary and partial differential equations, methods for sparse systems of linear equations, and eigenvalue problems.

**632 Database Systems** Fall, 4 credits. Prerequisites: CS 410 and 432 or permission of instructor.

2 lecs.  
Discussion of data models and the implementation of database systems, with an emphasis on current areas of research. Topics include the relational model, data-dependency theory, semantic modeling, query optimization, transaction management, and advanced issues in distributed databases.

**635 Information Organization and Retrieval** Spring, 4 credits. Prerequisite: CS 410 or permission of instructor.

2 lecs.  
Introduction to information retrieval. File organization and search algorithms. Statistical analysis of written texts. Automatic classification of information; language and content analysis of texts. Interactive filing and retrieval applied to documents and business correspondence. Automatic libraries, office automation systems, question-answering systems, and database retrieval.

**643 Design and Analysis of Computer Networks** Fall 4 credits. Prerequisite: CS 414 or permission of instructor. Not offered every year.

2 lecs.  
A course in computer networks and layered protocols. The following topics are presented: network topology design; data transmission within the physical layer; data-link sliding-window protocols; network layer in point-to-point long-haul networks, satellite and packet radio networks and local networks; transport and session layer protocols; internetworking. Selected topics from the presentation and application layers will also be discussed.

**652 Sparse Matrix Theory: Combinatorial Algorithms and Numerical Computation** Spring, 4 credits. Prerequisites: CS 621 and 681 or permission of instructor. Not offered every year.

2 lecs.  
Efficient methods for solving large, sparse systems of linear algebraic equations. Emphasis on the combinatorial aspects of sparse problems; tools include efficient graph algorithms and data structures as well as more conventional numerical linear algebra. Focus on direct as opposed to iterative methods. Much of the course is concerned with ordering strategies for Gaussian elimination and the resulting fill. Also discussed are sparse least-squares problems and large-scale programming.

**681 Analysis of Algorithms** Fall, 4 credits. Prerequisite: CS 481 or permission of instructor.

3 lecs.  
Major paradigms used in the creation and analysis of algorithms. Complexity measures, advanced data structures, algorithms on graphs, lower bounds, reducibilities, and polynomial complete problems. Special topics in analysis of algorithms. This course includes the contents of CS 482.

**682 Theory of Computing** Spring, 4 credits. Prerequisite: CS 481 or permission of instructor.

3 lecs.  
Advanced treatment of theory of computation, computational-complexity theory, and other topics in computing theory.

**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.

**711 Topics in Programming Languages and Systems** Spring, 4 credits. Prerequisites: CS 481 and 611 or permission of instructor. Not offered every year.

2 lecs.  
Topics are chosen at instructor's discretion.

**712 Topics in Programming Languages and Systems** Spring, 4 credits. Prerequisite: CS 612 or permission of instructor. Not offered every year.

2 lecs.  
Topic are chosen at instructor's discretion.

**713 Seminar in Operating Systems** Fall, spring, 4 credits. Prerequisite: CS 613 or permission of instructor.  
Discussion of contemporary issues in operating systems.

**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 systems.

**719 Seminar in Programming** Fall, spring, 4 credits. Prerequisite: CS 611 or permission of instructor. S-U grades only.

**721 Topics in Numerical Analysis** Fall, 4 credits. Prerequisite: CS 621 or 622 or permission of instructor. Not offered every year.

2 lecs.  
Topics are chosen at instructor's discretion.

**722 Topics in Numerical Analysis** Spring, 4 credits. Not offered every year.

2 lecs.  
Topics are chosen at instructor's discretion.

**729 Seminar in Numerical Analysis** Fall, spring, 4 credits. Prerequisite: permission of instructor. S-U grades only.

**[733 Topics in Information Processing]** Not offered 1983-84.

2 lecs.  
Topics are chosen at instructor's discretion ]

**[734 Seminar in File Processing]** Fall, Credit to be arranged. Prerequisite: CS 733 or permission of instructor. Not offered 1983-84.]

**739 Seminar in Information Organization and Retrieval** Fall, spring, Credit to be arranged. Prerequisite: CS 635 or permission of instructor. S-U grades only.

**747 Seminar in Semantics** Spring, 1 credit. Prerequisite: permission of instructor. S-U grades only.

**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.

**781 Topics in Analysis of Algorithms and Theory of Computing** Fall, 4 credits. Prerequisites: CS 681 and 682 or permission of instructor. S-U grades only. Not offered every year.

2 lecs.  
Topics are chosen at instructor's discretion.

**782 Topics in Analysis of Algorithms and Theory of Computing** Spring, 4 credits. Prerequisites: CS 681 and 682 or permission of instructor. S-U grades only. Not offered every year.

2 lecs.  
Topics are chosen at instructor's discretion.

**789 Seminar in Theory of Algorithms and Computing** Fall, spring, 2-4 credits. Prerequisite: permission of instructor. S-U grades only.

**790 Special Investigations in Computer Science** Fall, spring. Prerequisite: permission of a computer science adviser.  
Independent research.

**890 Special Investigations in Computer Science** Fall, spring. S-U grades only. Prerequisite: permission of a computer science adviser.  
Master's degree research.

**990 Special Investigations in Computer Science** Fall, spring. S-U grades only. Prerequisite: permission of a computer science adviser.  
Doctoral research.

## Electrical Engineering

### 114 Introduction to Microprocessors (also Engr 114) Fall, spring. 3 credits.

2 lecs, 1 lab.

For description see Engineering Common Courses.

### 210 Introduction to Electrical Systems (also Engr 210) Fall, spring. 3 credits. Prerequisites or corequisites: Mathematics 293 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.

### 230 Introduction to Digital Systems Fall, spring. 3 credits.

2 lecs, 5 lab experiments.

Introduction to basic analysis and design techniques and methodology of digital and computer systems. Boolean algebra, integrated circuit components used in digital-system implementation, codes and number systems, logic design of combinational circuits, logic design of sequential circuits, AHPL language and machines, sequencers, Von Neumann machines, addressing and memories. A simple computer is designed in class.

### 301 Electrical Signals and Systems I Fall. 4 credits. Prerequisites: EE 210 and Mathematics 294 or equivalents.

3 lecs, 1 rec-computing session.

Formulation of circuit equations, steady-state response; Laplace transform and applications; system functions; state description of linear systems; natural modes, initial conditions, forced response; two-port circuit descriptions; models for active circuits.

### 302 Electrical Signals and Systems II Spring. 4 credits. Prerequisite: EE 301.

3 lecs, 1 rec-computing session.

Single-sided and bilateral Laplace transforms; applications of complex functions and contour integration to system response; stability criteria; Fourier series and transforms; discrete and fast Fourier transforms; sampling.

### 303 Electromagnetic Theory I Fall. 4 credits. Prerequisites: Physics 214 and Mathematics 294.

3 lecs, 1 rec-computing session.

Foundation of electromagnetic theory. Topics include Maxwell's equations, boundary conditions, electrostatics, Poynting theorem, plane waves in isotropic media, impedance concept and reflections, transmission lines, rectangular waveguides, radiation, and simple antennas.

### 304 Electromagnetic Theory II Spring. 4 credits. Prerequisites: EE 301 and 303.

3 lecs, 1 rec-computing session.

Fundamentals of electromagnetic theory, with emphasis on wave propagation and guidance, radiating systems, and the effects of the medium on transmission. Topics include retarded potentials; relation of radiation fields to source distributions, antenna gain concepts, and techniques in antenna design; waveguide systems, separation of variables, cavities, and losses; propagation in inhomogeneous and anisotropic media, complex permittivity, plasma and magnetic field effects.

### 306 Fundamentals of Quantum and Solid-State Electronics Spring. 4 credits. Prerequisites: Physics 214, Mathematics 294, and EE 303.

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 Schrodinger'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.

### 310 Probability and Random Signals Spring. 4 credits. Prerequisite: Mathematics 294.

3 lecs, 1 rec-computing session.

Introduction to modeling random phenomena and signals and applications of these models. Topics include concepts of probability, conditional probability, independence, random variables, expectation and random processes. Applications to problems of inference, estimation, and linear system response in communications, computers, control, and pattern classification.

### 315 Electrical Laboratory I Fall. 4 credits.

Prerequisite: EE 210. Corequisite: EE 301.

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 theory and devices.

### 316 Electrical Laboratory II Spring. 4 credits.

Prerequisites: EE 303 and 315.

2 lecs, 2 labs.

Laboratory studies of solid-state phenomena and devices; experiments illustrating the use of the digital computer in electrical engineering; laboratory studies of high-frequency phenomena and devices; and introduction to AC and DC machinery.

### 407 Quantum Mechanics and Applications Fall. 4 credits. Prerequisite: EE 306.

3 lecs, 1 rec-computing session. C. L. Tang.

Fundamentals of quantum mechanics. Harmonic oscillators. Theory of angular momentum and atomic structures. Time-independent and time-dependent perturbation theory. Interaction of radiation and matter. Applications in spectroscopy, lasers, and solid-state physics.

### 421 Bioinstrumentation Fall. 3 credits (4 credits with lab). Prerequisites: EE 301 and 316.

3 lecs, 1 lab.

The acquisition and processing of biological signals. Topics include electrodes, ion-selective electrodes, temperature transducers, pressure transducers, flow transducers, force transducers, displacement transducers, operational amplifiers, instrumentation amplifiers, analog signal processing, D/A and A/D conversion, and digital processing with minicomputers and microprocessors.

### 422 Neuroelectric Systems (also Biological Sciences 422) Spring. 3 credits (4 credits with lab). Prerequisite: either EE 301 or 421 or Biological Sciences 423, 424, 495, or 496; written permission of instructor required for lab.

Disc, demonstration, and lab to be arranged.

R. R. Capranica, B. R. Land.

Application of microprocessors for neuroelectric data acquisition and systems analysis. Lectures cover electrical activity of single nerve cells, electrodes and instrumentation techniques, analysis of electro-physiological data, and coding principles in the nervous system. Laboratory exercises provide experience in the analysis of biological signals.

### 423 Introduction to Analog and Digital Signal Processing Fall. 3 credits (4 with lab). Prerequisite: EE 301.

3 lecs, 1 lab.

Design of passive filters and matching networks. Design of active filters using operational amplifiers. Design of transistor amplifiers. Digital-signal processing. Z-transform and discrete Fourier transform (DFT). Design of nonrecursive and recursive digital filters. Fast Fourier transform (FFT) algorithms.

### 424 Computer Methods in Electrical Engineering Spring. 4 credits. Prerequisite: EE 301. 3 lecs.

Modern techniques for solving electrical engineering problems on the digital computer. Emphasis on efficiency and numerical stability rather than on theoretical implications. Solution of linear and nonlinear algebraic equations; integration; solution of ordinary and partial differential equations; random-number generators. Applications to power systems, control systems, communication systems, circuit design, and problems in electrophysics.

### 426 Digital Signal Processing Spring. 3 credits (4 with lab). Prerequisite: EE 423 or permission of instructor.

3 lecs, 1 lab.

Topics include FIR and IIR filter design; the DFT, FFT, and CZT; spectral analysis; data compression; adaptive filters; and speech synthesis. Laboratory involves design of filters using minicomputer-based design tools and implementation of real-time digital filters with microprocessor-based filter systems. At the level of *Theory and Application of Digital Signal Processing*, by Rabiner and Gold.

### 427 Fundamentals of Analog and Discrete-Time Circuits 4 credits. Prerequisite: EE 302.

3 lecs.

Basic theory of analog networks. Linearity, time invariance, causality, passivity, stability. Analogous digital-system properties. The scattering formalism. Applications to physical realizability, reactance theorems, dispersion, gain-phase design. Realization of discrete-time circuits.

### [428 Analog and Discrete-Time Circuit Applications Spring. 4 credits. Prerequisite: EE 423, 427, or equivalent. Not offered 1983-84.

3 lecs.

Synthesis of analog transducers. Analog and digital transfer functions: maximally flat, Chebyshev, elliptic. Gain-bandwidth theory. Transmission-line properties with applications to microwave circuit design and relation to digital filters.]

### 430 Introduction to Lasers and Optical Electronics Spring. 4 credits. Prerequisite: EE 306 or equivalent (such as Physics 443).

2 lecs, 1 lec-rec, 1 lab.

An introduction to stimulated emission devices such as masers, lasers, and optical devices based on linear and nonlinear responses to coherent fields. Material discussed, based on quantum mechanics and classical electrodynamics, stresses applications to modern devices. Discussions of applications include the operating principles of a variety of important lasers, propagation characteristics of laser beams, optical modulators, and an introduction to integrated and fiber optics. Labs present an opportunity to work with a variety of the lasers and processes discussed in lectures.

### 431-432 Electronic Circuit Design 431, fall; 432, spring. Fall, 4 credits; spring, 3 or 4 credits. Prerequisites: EE 230 and 316.

3 lecs, 1 optional lab. R. J. Thomas.

Design techniques for circuits used in electronic instrumentation. A variety of circuits that employ discrete components, operational amplifiers, I-C timers, and logic circuitry are considered. Emphasis is placed on designing for specified function rather than on detailed analyses. At the level of *The Art of Electronics*, by Horowitz and Hill.

### 435-436 Semiconductor Electronics I and II 435, fall; 436, spring. 4 credits each term. Prerequisites: EE 306 and 316.

3 lecs, 1 lab.

Basic physics of semiconductor materials, with emphasis on properties important for semiconductor devices; crystals, band structure, electron and hole transport, interfaces and contacts, optical properties; junction diodes, bipolar and MOS transistors, lasers, and solar cells. In the second semester, the basic principles learned will be applied in the study of

devices and technologies commonly used in integrated circuits. Computer modeling of devices.

**442 Fundamentals of Acoustics (also T&M 666)** Spring. 3 credits.  
3 lecs, biweekly lab.  
See T&M 666 for course description.

**451-452 Electric Energy Systems I and II** 451, fall; 452, spring. 4 credits each term. Prerequisite for 451: EE 316 or permission of instructor.  
3 lec-recs, 1 lab-computing session. S. Linke.  
Engineering principles underlying operation of modern electric-power systems under steady-state and transient conditions emphasizing major power-system parameters. Digital computer used as dynamic "laboratory" model of complex power systems for load-flow, fault, stability, and economic-dispatch studies. At the level of *Elements of Power System Analysis* (fourth ed.), by Stevenson.

**475 Computer Structures** Fall. 4 credits.  
Prerequisite: EE 230.  
3 lecs, 1 lab. N. M. Vrana.  
Organization and design of digital computers. Hardwired and microprogrammed control sequencers, arithmetic hardware, and I/O systems. Each four-to-six-person laboratory group will design and construct a small digital computer.

**476 Microprocessor Systems** Spring. 4 credits.  
Prerequisite: EE 475.  
3 lecs, 1 lab. N. M. Vrana.  
System design using microprocessors. Hardware and software techniques employed for logic design, interfacing, instrumentation, and control. The use of development systems.

**480 Thermal, Fluid, and Statistical Physics for Engineers** 3 credits. Prerequisite: Physics 214.  
R. Liboff.  
Extensive review of thermodynamic principles. Elementary theory of transport coefficients. Elements of fluid dynamics. Shockwaves. Central-limit theorem. Random walk. Electrical noise. Quantum and classical statistics. Black-body radiation. Thermal properties of solids. Elementary descriptions of the p-n junction, superfluidity, superconductivity, and the laser.

**481 Elementary Plasma Physics and Gas Discharges** Fall. 3 credits. Prerequisites: EE 303 and 304 or equivalent.  
2 lecs, 1 lab, field trips.  
Principles and practices required to perform diagnostics of plasmas and intense particle beams. Coordinated lectures and ten experiments. Plasma breakdown, collisions, diffusion, sheaths. Reflex discharge. Discussion of macroscopic and microscopic measurements. Langmuir and other probes. Electromagnetic and spacecharge waves. Microwave and optical radiation. Intense particle beams. Methods for data collection and analysis.

**484 Introduction to Controlled Fusion: Principles and Technology (also NS&E 484)** Spring. 3 credits. Prerequisites: EE 301 and 303 or permission of instructor. Intended for seniors and graduate students.  
3 lecs. P. L. Auer.  
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.

**491-492 Senior Project** 491, fall; 492, spring. 3 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.

**521 Theory of Linear Systems** Fall. 4 credits.  
Prerequisite: EE 302 or permission of instructor.  
The state-space model for linear systems. Fundamental and transition matrices. Matrix exponential functions, the Cayley-Hamilton theorem, and the Jordan form. Forced network and system response. Controllability, observability, stability, realizability. Applications of Fourier, Laplace, Hilbert transforms. Paley-Wiener theorem. At the level of *System Theory*, by Padulo and Arbib.

**531 Quantum Electronics I** Fall. 4 credits.  
Prerequisites: EE 306 and 407 or Physics 443.  
3 lecs, 1 rec-computing session.  
A detailed treatment of the physical principles underlying lasers and masers, related fields, and applications. Topics include a review of quantum mechanics and the quantum theory of angular momentum; the interaction of radiation and matter, including emission, absorption, scattering, and macroscopic material properties; theory of the laser, including methods of achieving total and partial population inversion; optical resonators; output power of amplifiers and oscillators; dispersive effects and laser oscillation spectrum.

**532 Quantum Electronics II** Spring. 4 credits.  
Prerequisite: EE 531 or permission of instructor.  
3 lecs, 1 rec-computing session.  
A continuation of EE 531. Topics include spectroscopy of atoms, molecules, and ions in crystals as examples of laser media; density matrix; nonlinear optics and optical processes; theory of coherence; integrated optics and optical communication.

**533 Solid-State Microwave Devices and Circuits I** Fall. 3 credits. Prerequisite: EE 304.  
2 lecs, 1 lab.  
Theoretical and experimental studies of circuits, amplifiers, oscillators, detectors, receivers, and electrical noise at microwave frequencies. Typical topics: one- and two-port resonators; negative resistance amplifiers; oscillator load characteristics, locking and stabilization; microwave amplifiers; intermodulation effects; resistor and shot noise; noise temperature, FM noise. Laboratory makes use of Hewlett-Packard Network Analyzers and other microwave equipment.

**534 Solid-State Microwave Devices and Circuits II** Spring. 3 credits. Prerequisite: EE 533.  
2 lecs, 1 lab.  
Basic theories of solid-state devices at microwave frequencies. Specific devices studied: varactors, avalanche diodes; transferred electron diodes; p-n-p oscillator diodes; tunnel diodes; pin diodes; detectors and microwave transistors. Studies of experimental methods of characterizing these devices include use of Hewlett-Packard Network Analyzer and other microwave equipment.

**536 VLSI Technology** Spring. 4 credits.  
Prerequisite: EE 435 or permission of instructor.  
2 lecs, 1 lab. P. Krusius.  
Integrated-circuit, especially VLSI, technology for solid-state circuits in the fields of computer hardware, telecommunication systems, and opto-electronics, with emphasis on processing, device design, and logic-gate design. Lithography, crystal growth, diffusion, ion implantation, oxidation, chemical-vapor deposition, evaporation, sputtering, molecular-beam epitaxy, etching, and in-process measurements. Process and device simulations. Silicon IC technologies with emphasis on MOS and bipolar devices and circuits. Standard processes, device and logic-gate design. Systems on chip. At the level of current papers in *IEEE Transactions on Electron Devices*.

**555 Advanced Power Systems Analysis I** Fall. 3 credits. Prerequisites: EE 302 and concurrent

registration in 451, or permission of instructor.  
Analysis of power-system components. These components include rotating machines and systems for excitation control, automatic voltage regulation, boiler-turbine control, and speed regulation, as well as ancillary three-phase networks. Emphasis on derivation of mathematical models from first principles; development of algorithms for the formation of applicable network matrices.

**556 Advanced Power Systems Analysis II** Spring. 3 credits. Prerequisite: EE 555 or permission of instructor.  
Computer methods in power systems applied to short-circuit studies, load-flow studies, transient-stability studies, economic dispatch, and security load flows. Use of sparse-matrix techniques. Comparison of algorithms for digital relaying. State-estimation algorithms. Emphasis on the use of the digital computer in the planning and operation of large-scale power systems. At the level of *Computer Methods in Power System Analysis*, by Stagg and El-Abiad.

**561 Error-Correcting Codes** Fall. 3 credits.  
Prerequisite: linear algebra.  
An introduction to the theory of error-correcting, linear block codes. Hamming codes, minimum distance, standard array, minimum distance decoding, cyclic codes. New codes from old and the dual code. The Hamming sphere packing and the Singleton bound 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. Burst error-correcting and concatenated codes.

**562 Fundamental Information Theory** Spring. 3 or 4 credits (4 with lab). Prerequisite: EE 310 or equivalent. Prerequisite for lab only: EE 561 with lab.  
3 lecs, 1 lab.  
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. Laboratory projects investigate problems of statistical characterization of sources and channels using computer simulation.

**564 Decision Making and Estimation** Fall. 4 credits. Prerequisite: EE 310 or equivalent.  
Utility theory and Bayes, minimax, and Neyman-Pearson decision theories. Bayes and maximum likelihood estimation. Cramer-Rao bound, Fisher information, efficient and consistent estimates. Applications drawn from the areas of pattern classification, detection, and communications.

**567 Communication Systems I** Fall. 4 credits.  
Prerequisite: EE 310 or equivalent.  
2 lecs, 1 rec.  
Analog and digital signal representation, spectral analysis, linear-signal processing, modulation and demodulation systems. Time- and frequency-division multiplex systems. Introduction to random processes and noise in analog and digital systems.

**568 Communication Systems II** Spring. 4 credits.  
Prerequisite: EE 567 or equivalent.  
An introduction to digital communications. Discrete representations for signals: pulse-code modulation (PCM), delta modulation (DM), differential pulse-code modulation (DPCM), companding and Huffman coding. Digital modulator/demodulators (MODEMs): signal sets such as phase shift keying (PSK), frequency shift keying (FSK), maximum-a-posteriori (MAP) and maximum-likelihood (ML) receivers, probability of error, symbol-timing and carrier-tracking loops, and intersymbol interference (ISI). Coded systems: convolutional codes, Viterbi and sequential decoding. Multiplexing: time division (TDM), frequency division (FDM), code division (CDM). Spread spectrum.



**571 Feedback Control Systems** Fall. 3 credits (4 with lab). Prerequisite: 302 or permission of instructor. 3 lecs, 1 lab. C. R. Johnson.

Analysis techniques, performance specifications, and analog-feedback-compensation methods for continuous-time systems. Design techniques include root-locus and frequency-response methods. Laplace transforms and transfer functions are the major mathematical tools. Laboratory work provides experience with measurement of system frequency-response, transient-response, and transfer function; design and compensation of linear-positional and speed-control systems; and computer-aided design techniques. Laboratory emphasis is on correlation of theoretical and experimental results.

**572 Digital Control Systems** Spring. 3 credits (4 with lab). Prerequisite: EE 571 or permission of instructor.

3 lecs, 1 lab. C. R. Johnson.  
Analysis and design of feedback control systems using digital devices to implement compensation. Z-transforms, digital equivalents, root-locus, PID, deadbeat, and state-variable techniques will be used. Quantization and sample-rate effects in sampled-data control systems will be considered. Laboratory work will consist of computer-aided controller design and digitally simulated evaluation.

**573 Estimation and Control in Discrete Linear Systems** Fall. 4 credits. Prerequisites: EE 302 and 310 or permission of instructor.

3 lecs.  
Optimal control, filtering, and prediction for discrete-time linear systems with extensive use of the APL system. Approximation on discrete point sets. The principle of optimality. Kalman filtering. Stochastic optimal control.

**574 Optimal Control and Estimation for Continuous Systems** Spring. 4 credits.  
Prerequisite: EE 573 or permission of instructor.

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.

**576 Parallel Processing** Spring. 3 credits.  
Prerequisite: EE 577 or permission of instructor.  
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.

**577 Computer Processor Organization and Memory Hierarchy** Fall. 4 credits. Prerequisites: EE 476 and 310, or permission of instructor.

H. C. Torng.  
Design and evaluation of processor and memory architectures are examined in the light of actual implementations of both large-scale and small-scale (microprocessor) systems. Topics include microprogramming, parallel and pipelined architectures, interleaved memories, cache and virtual memories, I/O processors, vector and array processors, and protection mechanisms.

**578 Computer Networks and Distributed Architecture** Spring. 4 credits. Prerequisite: EE 577 or permission of instructor.

H. C. Torng.  
Methods and approaches to distributed processing, carrier-sensing multiple-access schemes with collision detection, token-access rings, local-area networks, packet switches, wide-area networks, computer-communication protocols.

**581 Introduction to Plasma Physics (also A&EP 606)** Fall. 4 credits. First-year graduate-level course; open also to exceptional fourth-year students at discretion of instructor. Prerequisites: EE 303 and 304 or equivalent.

3 lecs.  
Plasma state; motion of charged particles in fields; collisions, coulomb scattering; transport coefficients, ambipolar diffusion, plasma oscillations and waves; hydromagnetic equations; hydromagnetic stability and microscopic instabilities; test particle in a plasma; elementary applications.

**582 Advanced Plasma Physics (also A&EP 607)** Spring. 4 credits. Prerequisite: EE 581.

3 lecs.  
Boltzmann and Vlasov equations; waves in hot plasmas; Landau damping, microinstabilities; drift waves, low-frequency stability, collisional effects; method of dressed test particles, high-frequency conductivity and fluctuations; neoclassical toroidal diffusion, high-powered beams.

**583 Electrodynamics** Fall. 4 credits. Prerequisite: EE 304 or equivalent.

3 lecs.  
Maxwell's equations, electromagnetism potentials, solution of Laplace and Poisson equations, Green's functions. Special theory of relativity, covariant formulation of Maxwell's equations, Lienard-Wiechert potentials, radiation from accelerated charges, Cerenkov radiation. Electrodynamics of dispersive media. At the level of *Classical Electrodynamics*, by Jackson.

**584 Microwave Theory** Spring. 4 credits.  
Prerequisite: EE 304 or equivalent.

3 lecs, 1 rec. P. McIsaac.  
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.

**585-586 Upper Atmosphere Physics I and II** 585, fall; 586, spring. 3 credits each term.

3 lecs.  
Physical processes in the earth's ionosphere and magnetosphere, the solar corona, and the solar wind. Diagnostic techniques including radar and *in situ* observations; production, loss, and transport of charged particles in the ionosphere and magnetosphere; airglow; tides, winds, and gravity waves; electric fields generated by the solar wind and winds in the neutral atmosphere, and their effects on transport processes; the equatorial and auroral electrojets; instabilities in space plasmas, structure of the solar corona and solar wind and their interaction with the magnetosphere; acceleration and drift of energetic particles in the magnetosphere; precipitation of particles and the aurora; magnetic and ionospheric storms.

**[587 Electromagnetic Wave Propagation I]** Fall. 3 credits. Prerequisite: EE 304 or equivalent. Not offered 1983-84.

3 lecs.  
Some aspects of antenna theory; diffraction; refraction and ducting in the troposphere; propagation of radio waves and cold plasma waves in the ionosphere and magnetosphere; Alfvén, whistler-mode, and hybrid waves; the CMA diagram; WKB solutions of the coupled wave equations.]

**588 Electromagnetic Wave Propagation II** 3 credits. Prerequisite: EE 587.

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; radio-star and satellite scintillations and their use as diagnostic tools; radar astronomy.

**589 Magnetohydrodynamics** Spring. 3 credits  
Prerequisite: EE 581 or equivalent. Offered alternate years.

C. E. Seyler.  
The theory of ideal and resistive magnetohydrodynamical equations with emphasis on application to controlled thermonuclear fusion. Topics: derivation and domain of applicability; invariants, waves, and characteristics; static and stationary equilibrium; Grad-Shafranov equation; magnetic islands and 3-D equilibrium; linearized equations and normal-mode stability analysis; energy-principle and variational techniques; continuous spectrum; sharp-boundary model; cylindrical and toroidal confinement geometries; stability conditions; resistive effects. At the level of *MHD Instabilities*, by G. Bateman.

**591-599 Graduate Topics in Electrical Engineering** 1-3 credits.

Seminar, reading course, or other special arrangement agreed upon between the students and faculty members concerned.

**[633 Opto-Electronic Devices]** Fall. 4 credits  
Prerequisites: EE 304 and 435 or equivalent. Not offered 1983-84.

3 lecs, 1 rec.  
An understanding of physical properties of solids that affect use in optical devices is sought. Wave propagation in lossy, anisotropic, layered, and electro-optic media: microscopic and band-theoretic models for dielectric constant and loss; carrier transport, scattering, and trapping; photoconductivity; electro-optics, photoemissive, and photoconductive devices; noise in optical detectors.]

**[634 Theory and Applications of Nonlinear Optics]** 4 credits. Prerequisite: EE 531 or 633 or equivalent of Physics 572. Not offered 1983-84.

3 lecs, 1 rec.  
Basic concepts and recent developments in nonlinear and electro-optics. Topics include higher-order perturbation theory of the Schroedinger and density-matrix equations and their applications in nonlinear optics; classical anharmonic oscillators; nonlinear optical properties of organic and inorganic crystals and semiconductors; harmonic generation and multiphoton processes; nonlinear and electro-optical devices and their applications in, for example, spectroscopy and optical communications. At the level of Rabin and Tang and current literature.]

**[635 Solid-State Devices I]** Fall. 4 credits.  
Prerequisite: EE 436 or equivalent. Not offered 1983-84.

3 lecs.  
Band structure, generation-recombination statistics, ambipolar transport, deep-level spectroscopy, p-n junction analysis, contact technology, secondary ionization, and noise. A review of ion-implantation technology with emphasis on associated material and device problems. Topics are presented on the level of current literature on device research. Presentation concentrates on relating basic material properties to device parameters. Term paper.]

**[636 Solid-State Devices II]** Spring. 4 credits.  
Prerequisite: EE 635 or equivalent. Not offered 1983-84.

3 lecs.  
A general treatment of the time dependence of secondary ionization and the simpler "quasistatic" approximation. Applications to microwave generation and amplification and broadband optical detection, including stability, nonlinearity, and noise. The fundamentals of transferred electron devices, including band structure, distribution function, stability, and doping configurations of devices. Term paper.]

**638 Materials and Device Physics for VLSI** 2-3 credits. Prerequisite: EE 436 or equivalent.

J. Frey.  
Materials and device problems to be considered in the design and fabrication of VLSI circuits. High-field electron and hole transport; nonequilibrium electron

transport; impact ionization; solutions of Boltzmann's equation using Monte Carlo techniques; role of velocity overshoot in short-channel devices; comparison of elemental and compound semiconductors. Submicron-scale phenomena in MOSFETs and bipolar devices; implications for circuit design.

**639 VLSI Digital-System Design** Fall. 4 credits. Prerequisites: EE 435 and 476 or equivalent. The foundations of LSI system design and implementation; examples of LSI system design; and topics of current research relating to system timing, arrays of extensive LSI devices, algorithms consistent with VLSI processor arrays, and organization of hierarchical and concurrent computing devices. VLSI realization: MOS devices and circuits, chip real estate, cell layout, chip input-output circuitry, fabrication, packaging, and testing. A laboratory project is required.

**661-662 Random Processes in Electrical Systems** 661, fall; 662, spring. 4 credits each term. Prerequisites: EE 302 and 310.

3 lecs.  
The concepts of randomness and uncertainty and their relevance to the design and analysis of electrical systems. An axiomatic characterization of random events. Probability measures, random variables, and random vectors. Distribution functions and densities. Functions of random vectors. Expectation and measures of fluctuation. Moments and probability inequalities. Properties and applications of characteristic functions. Modes of convergence of sequences of random variables; laws of large numbers and central limit theorems. Kolmogorov consistency conditions for random processes. Poisson process and generalizations. Gaussian processes. Covariance stationary process, correlation function, spectra; Bochner and Wiener-Khinchin theorems. Continuity, integration, and differentiation of sample functions. Optimum filtering and prediction. Spectral representation, orthogonal series representations, Markov chains and processes. Linear and nonlinear transformations of random processes.

**663 Advanced Topics in Information Theory** Fall. 4 credits. Prerequisites: EE 562 and either EE 661 or Mathematics 571 or permission of instructor.

3 lecs.  
An in-depth treatment of an information-theory research area. The topic varies from year to year and is chosen from the following subjects: source encoding (rate-distortion theory), decentralized systems, multiterminal communication networks, ergodic theory and information, complexity and instrumentability of coding schemes, coding for computer memory.

**664 Foundations of Inference and Decision Making** Spring. 3 credits. Prerequisite: a course in probability and some statistics, or permission of instructor.

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.

**673 Random Processes in Control Systems** Spring. 4 credits. Prerequisites: EE 662 and 574. Prediction and filtering in control systems: Gaussian-Markov process, prediction problem, stochastic optimal and adaptive control problems. Control of systems with uncertain statistical parameters; stochastic differential equations, optimal nonlinear filtering; stability of control systems with random parameters.

**674 Adaptive Parameter Estimation** Spring. 3 credits. Prerequisites: EE 426 and 572, or permission of instructor.

Discrete techniques of recursive parameter estimation. The course focuses on equation- and output-error formulations for parameter estimation in autoregressive, moving-average processes. Stability theory applicable to such nonlinear, time-varying systems is developed and used to analyze the convergence of various algorithms, including gradient-descent search, recursive least-squares, and recursive maximum-likelihood. These algorithms are applied to problems in adaptive filtering, identification, and control.

**681 Kinetic Theory (also A&EP 761)** Spring. 3 credits. Prerequisite: EE 407 or Physics 561, or permission of instructor. Offered alternate years.

3 lecs. R. L. Liboff.  
Theory of the 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. The Klimontovich formulation. At the level of *Introduction to the Theory of Kinetic Equations*, by Liboff.

**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.

**693-694 Electrical Engineering Design** 693, fall; 694, spring. 3 credits each term. For students enrolled in the M.Eng.(Electrical) degree program. Utilizes real engineering situations to present fundamentals of engineering design.

**695-696 Graduate Topics in Electrical Engineering** 1-3 credits.  
Seminar, reading course, or other special arrangement agreed upon between the students and faculty members concerned.

**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

**101 Introductory Geological Sciences (also Engr 118)** Fall, spring. 3 credits.

2 lecs, 1 lab, field trips. Evening exams. W. B. Travers, fall; A. L. Bloom, spring.  
Understanding the natural earth; weathering, erosion, the evolution of coastlines and river valleys, glaciation, the origins of earthquakes and mountains, the genesis of volcanoes, and the drifting of continents. Studies of groundwater, mineral deposits, petroleum, and coal. Recognizing major minerals and rocks, interpretation of topographic and geologic maps.

**102 Introduction to Historical Geology** Spring. 3 credits. Prerequisite: Geol 101 or permission of instructor.

2 lecs, 1 lab. Evening exams. J. L. Cisne.  
A continuation of Geol 101; history of the earth and life in terms of evolutionary processes. The geologic record, its formation, and interpretation of earth history. Introduction to the evolution of life and to fossils and their use in reconstructing past environments and dating rocks.

**[103 Earth Science]** Fall. 3 credits. To be taken concurrently with Geol 105, Earth Science Laboratory. Not offered 1983-84.

3 lecs. A. L. Bloom.  
Physical geography, including earth and lunar orbits that determine seasons and tides. Figure and structure of the earth; climatic regions; atmospheric and oceanic circulation; erosion by rivers, glaciers, wind, and waves; climatic change.]

**[105 Earth Science Laboratory]** Fall. 1 credit. To be taken concurrently with Geol 103, Earth Science. Not offered 1983-84.

A. L. Bloom.  
Astronomical determination of position and seasonal events. Topographic mapping and map interpretation. Minerals and rocks, world climatic regions.]

**107 Frontiers of Geology I** Fall. 1 credit. May be taken concurrently with or after Geol 101.

1 lec. J. L. Cisne and staff.  
Lectures by members of the department on selected fundamental topics of current interest, such as continental drift and related tectonic processes, volcanoes, earthquake prediction, natural energy sources, and mineral resources.

**108 Frontiers of Geology II** Spring. 1 credit. May be taken concurrently with or after Geo 101 or 102.

1 lec. J. L. Cisne and staff.  
Lectures by members of the department on selected fundamental topics of current interest such as plate tectonics, the evolution of mountain belts and island arcs, the deep structure of continents, ecology and evolution of fossil organisms, correlation of strata by fossils, sea-level changes, and fossil fuels.

**[131 Geology and the Environment]** Fall. 3 credits. Field trips. Not offered 1983-84.

2 lecs, 1 lab.  
The principles of geological science, with emphasis on the physical phenomena and rock properties as they influence the natural environments of man.]

**210 Introduction to Methods in Geological Sciences** Fall. 2 credits. Prerequisite: Geol 101 or coregistration. Field trips.

D. E. Karig and staff.  
An introduction to the methods by which rocks are used as a geological database. Students will be familiarized with such field methods as use of Brunton compass, construction of geologic maps and sections from field data, and description of strata. Meetings will be held on Saturday mornings. All work will be done in the Ithaca area with the exception of one more-distant weekend field trip.

**262 Mineral and Energy Resources and the Environment** Spring. 3 credits. No prerequisites. Offered alternate years.

2 lecs, 1 lab. A. K. Gibbs.  
A topical look at mineral and energy resource systems, their organization, and some of the physical, temporal, economic, and political constraints within which they operate. Not a survey course in geology or economics; instead, the focus is on a few exemplary problems and commodities.

### Junior, Senior, and Graduate Courses

Of the following, the core courses Geol 325, 355, 356 (or 358), 376, and 388 may be taken by those who have successfully completed Geol 101-102 or the equivalent or who can demonstrate to the instructor that they have adequate preparation in mathematics, physics, chemistry, biology, or engineering.

**325 Structural Geology and Sedimentation** Spring. 4 credits. Prerequisite: Geol 101 or permission of instructor.

3 lecs, 1 lab. W. B. Travers.  
Nature, origin, and recognition of geologic structures. Behavior of geologic materials. Geomechanical and tectonic principles applied to the solution of geologic problems.

**345 Geomorphology** Fall. 4 credits. Prerequisite: Geol 102 or permission of instructor.

2 lecs, 1 lab. A. L. Bloom.  
Origin of land forms and description in terms of structure, process, and stage.

**355 Mineralogy** Fall. 4 credits. Prerequisite: Geol 101 or permission of instructor.

2 lecs, 2 labs; 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.

**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.

**358 Petrology and Petrography** Spring. 4 credits. Prerequisite: Geol 355.

2 lecs, 2 R 10:10; 2 labs; T R or F 2-4:25. J. M. Bird.  
Igneous, metamorphic, and sedimentary rocks; their composition and texture in hand-specimen and thin-section; environments of formation. The petrologic cycle in the context of lithosphere plate evolution. Introductory phase-equilibria of common rock-forming mineral binary and ternary systems. Intended to provide a broad background in petrology and petrography for students interested in geologic mapping, regional tectonics, and structural geology. A modest laboratory fee is charged for student specimens; the fee is returned at the end of the semester if the specimens are returned in good condition.

**376 Sedimentology and Stratigraphy** Fall. 4 credits. Recommended: Geol 102.

2 lecs, 2 labs, field trips. S. B. Bachman and J. L. Cisne.  
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.

**388 Geophysics and Geotectonics** Spring. 4 credits. Prerequisites: Mathematics 192 and Physics 208 or equivalent.

3 lecs, 1 lab. B. L. Isaacs.  
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.

**410 Experiments and Techniques in Earth Sciences** Spring. 2 credits. Prerequisites: Physics 207-208 and Mathematics 191-192 or equivalents, or permission of instructor.

S. Kaufman.  
Laboratory and field experiments chosen in accordance with students' interests. Familiarization with instruments and techniques used in earth sciences. Independent work is stressed.

**423 Petroleum Geology** Fall. 3 credits. Recommended: Geol 325.

2 lecs, 1 lab. S. B. Bachman.  
Introduction to hydrocarbon exploration and development. Source rock and fluid migration studies, oil and gas entrapment, reservoir rocks. Exploration techniques, including basin analysis, subsurface mapping, seismic reflection methods and processing

seismic mapping, seismic stratigraphy. Drilling techniques, well logs and their use in stratigraphic and structural interpretations, leasing and economics, career development.

**[424 Tectonics of Orogenic Zones, Modern and Ancient]** Spring. 3 credits. Prerequisite: permission of instructors. Offered alternate years. Not offered 1983-84.

1 lec. D. E. Karig, W. B. Travers.  
A comparative study of island arcs and mountain ranges.]

**428 Geomechanics** Spring. 3 credits. Prerequisites: Mathematics 192, Geol 101.

3 lecs. D. L. Turcotte.  
Use of mathematical analysis to explain such geological observations as ocean ridges—their thermal structure, elevation, heat flow, and gravity; ocean trenches—the structure and mechanics of the bending lithosphere; folding-buckling, viscous and plastic flow; faulting—a detailed mechanical and geological study of the San Andreas fault; intrusives—geothermal power.

**431 The Earth's Crust: Structure, Composition, and Evolution** Fall. 3 credits. Prerequisites: Geol 356 and 388.

3 lecs. L. D. Brown.  
Structure and composition of the crust from geophysical observations, analysis of xenoliths, and extrapolation of petrological laboratory data. Radioisotopic considerations. The nature of the crust-mantle boundary. Thermal and rheological structure of the crust. Oceanic vs. continental crust. Origin and evolution of oceanic and continental crust.

**432 Digital Processing and Analysis of Geophysical Data** Spring. 3 credits. Prerequisites: Geol 488 and familiarity with a programming language.

3 lecs. L. D. Brown.  
Sampling theory. Fourier, Laplace, and Z-transform techniques. Spectral analysis. Temporal and spatial filtering. Geophysical modeling. Deconvolution, migration, and velocity analysis of reflection data.

**433 Interpretation of Seismic Reflection Data** Spring. 3 credits. Prerequisite: Geol 488 or equivalent.

2 lecs, 1 lab. L. D. Brown.  
Techniques for inferring geologic structure and lithography from multichannel seismic reflection data. Data processing sequences, migration, velocity analysis, correlation criteria, resolution considerations, wave-form analysis, and synthetic seismograms. Synergistic approaches to interpretation. Seismic stratigraphy.

**454 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. Reading from the literature and petrographic examination of pertinent examples.

**[455 Isotope Geology]** Fall. 3 credits. Prerequisite: Geol 355-356 or equivalent. Not offered 1983-84.

3 lecs. R. W. Kay.  
Nucleosynthetic processes and the isotopic abundance of the elements. Dating by Pb, Ar, Sr, and Nd isotope variations. Theories of crustal and mantle evolution. Pleistocene chronology using U-series and <sup>14</sup>C dating. Time constants for geochemical cycles. The use of O and H isotopes as tracers in the earth's hydrosphere, and hydrothermal circulation systems.]

**456 Chemical Geology** Spring. 3 credits. Prerequisite: Geol 355-356 or equivalent.

2 lecs, 1 lab. W. A. Bassett, R. W. Kay.

Crystallography and crystal chemistry of minerals and the methods of their study. Thermodynamic evaluation of homogeneous and heterogeneous equilibrium and disequilibrium processes of geologic interest. Topics include crystal symmetry, mineral structures, X-ray diffraction, mineral equilibrium, and diffusion in minerals.

**461 Mineral Deposits** Fall. 4 credits. Prerequisite: Geol 356 or permission of instructor.

3 lecs, 1 lab, field trip. A. K. Gibbs.  
Introduction to mineral resources; sedimentary, magmatic, and hydrothermal ore deposits; topics in geochemistry; ore microscopy.

**[462 Mineral Exploration]** Spring. 4 credits. Prerequisite: Geol 461 or permission of instructor. Offered alternate years. Not offered 1983-84.

3 lecs, field trip. A. K. Gibbs.  
Exploration geochemistry, geophysics, and geology; design of exploration programs; topics in economic geology.]

**472 Paleobiology** Spring. 4 credits. Prerequisites: Biological Sciences 101-102 and 103-104 or equivalent, and either Geol 376, Biological Sciences 212 or 274, or permission of instructor.

3 lecs, M W F 12:20. J. L. Cisne and staff.  
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.

**473 Sedimentation and Tectonics** Spring. 3 credits. Prerequisite: Geol 376 or permission of instructor.

2 lecs, 1 disc. S. B. Bachman.  
Interaction of sedimentation and tectonics in development of stratigraphic sequences. Framework of deep ocean, active margin, passive margin, and cratonic sedimentation and stratigraphy. Seismic stratigraphy and the effects of sea-level changes on the stratigraphic record; sedimentary petrology and tectonism. Examples of margin and cratonic development throughout the geologic record. Problems with applying plate tectonic models to very old rocks.

**483 Marine Tectonics** Fall. 3 credits. Prerequisites: Geol 325 and a course in physics or geophysics.

2 lecs, possible field trips. D. E. Karig.  
Study of geophysical and geological characteristics of the earth's crust beneath the oceans. Review of strengths and limitations of marine exploratory techniques. Emphasis on recent geologic data concerning plate margins in the ocean, especially the island arc systems

**[485 Physics of the Earth I]** Fall. 3 credits. Limited to upperclass engineers, majors in the physical sciences, and others by permission of instructor. Not offered 1983-84.

2 lecs, 1 lab. D. L. Turcotte.  
Rotation and figure of the earth, gravitational field, seismology, geomagnetism, creep and anelasticity, radioactivity, earth's internal heat, continental drift, and mantle convection.]

**488 Geophysical Prospecting** Fall. 3 credits. Prerequisites: Physics 112 and 213 and Mathematics 191-192, or equivalents, or permission of instructor.

2 lecs. S. Kaufman.  
Physical principles, instrumentation, operational procedures, and interpretation techniques in geophysical exploration for oil, gas, and minerals. Seismic reflection, seismic refraction, gravity, and magnetic and electrical methods of exploration.

**[489 Earthquakes and Tectonics]** Fall. 3 credits. Prerequisite: introduction to geology, physics, calculus, or permission of instructor. Offered alternate years. Not offered 1983-84.

B. L. Isacks.

The mechanism 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.]

**490 Senior Thesis** Fall, spring 2 credits  
Staff.

Thesis proposal to be discussed with adviser during the junior year. Participation requires acceptance of a thesis proposal by the faculty committee.

**608 Advanced Topics in Structural Geology**

Spring. 3 credits. Prerequisites: Geol 325 and Math 298 or equivalent, or permission of instructor.  
3 lecs. D. E. Karig.

One or several topics in structural geology considered in greater depth than in Geol 325. Topics include thrust fault systems—geometries, distribution of deformation, and quantitative models; mechanics of deformation in sediments; transport and assembly processes for displaced terranes; and micro-fabric analysis. The format will mix lecture and seminar; the approach will be observational, experimental and/or analytical, as appropriate to the topic.

**610-639 Seminars and Special Work** Fall and spring. 2 or 3 credits each term. Prerequisite: permission of instructor.

Advanced work on original investigations in geological sciences. Topics change from term to term.

**610 Tectonic and Stratigraphic Evolution of Sedimentary Basins**

W. B. Travers.

**611 Petrology and Geochemistry**

R. W. Kay.

**612 Advanced Geomorphology Topics**

A. L. Bloom.

**613 Marine Geology**

D. E. Karig.

**614 Advanced Topics in Sedimentology and Stratigraphy**

S. B. Bachman.

**615 Topics in Mineral Resource Studies and Precambrian Geology**

A. K. Gibbs.

**616 Plate Tectonics and Geology**

J. M. Bird.

**617 Paleobiology**

J. L. Cisne.

**618 Geophysics, Exploration Seismology**

L. D. Brown

**619 Earthquakes and Tectonics**

B. L. Isacks.

**620 Exploration Seismology, Gravity, Magnetism**

S. Kaufman.

**621 Geophysics, Seismology, and Geotectonics**

J. E. Oliver.

**623 Mineralogy and Crystallography, X-Ray Diffraction, Microscopy, High-Pressure/Temperature Experiments**

W. A. Bassett.

**[629 Geology of Orogenic Belts** Fall. 4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1983-84.

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.]

**631 Research on Seismic-Reflection Profiling of the Continental Crust**

J. E. Oliver, L. D. Brown, S. Kaufman.

**633 Advanced Topics in Petrology and Tectonics I**

J. M. Bird, W. A. Bassett.

**634 Advanced Topics in Petrology and Tectonics II**

J. M. Bird, W. A. Bassett.

**635 Seminar in Tectonics**

D. E. Karig, S. B. Bachman.

**636 Seminar in Rock and Sediment Deformation**

D. E. Karig

**637 Seminar in Petrology and Geochemistry**

R. W. Kay

**639 Seismic Record Reading**

B. L. Isacks.

**642 Glacial and Quaternary Geology** Spring. 3 credits. Prerequisite: Geol 345 or permission of instructor.

2 lecs, 1 lab; several S field trips.

A. L. Bloom.

Glacial processes and deposits and the stratigraphy of the Quaternary.

**681 Geotectonics** Fall. 4 credits. Prerequisite:

permission of instructor. Offered alternate years.

2 lecs, T R 10:10. 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.

**[685 Advanced Geophysics I** Fall. 3 credits

Prerequisite: Geol 388. Not offered 1983-84.

3 lecs. D. L. Turcotte.

Mantle convection, heat flow, the driving mechanism for plate tectonics, the energy balance, definition of the lithosphere.]

**[686 Advanced Geophysics II** Spring. 3 credits

Prerequisite: Geol 388. Not offered 1983-84.

3 lecs. D. L. Turcotte.

Gravity, figure of the earth, earth tides, magnetism, mechanical behavior of the lithosphere, changes in sea level.]

**687 Seismology I** 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.

## Field Courses

**401 Field Geology** Summer. 6 credits.

Prerequisites: Geol 325 or permission of instructor.

Six weeks at the Sierra Madre Field Camp, Wyoming. Fee, \$1650.

W. B. Travers.

Field mapping techniques in igneous, metamorphic, and sedimentary rock, using topographic maps and air photos. The structural geology, petrology, geomorphology, and sedimentology of parts of the Overthrust Belt, Yellowstone-Jackson region, Hanna Coal Basin, Wind River, and Beartooth Mountains will be studied. An independent project and report will be done during the last week. Sierra Madre field geology is a joint program of the Cornell, Yale, and Harvard departments of geological sciences.

**[601 Intersession Field Trip** January intersession. 1 credit. Prerequisites: Geol 101-102 or equivalent and permission of instructor. Travel and subsistence expenses to be announced. Not offered 1983-84.

A trip of one week to ten days in an area of interesting geology in the lower latitudes. Interested students should contact the instructor during the early part of the fall semester.]

**604 Western Adirondack Field Course** Spring.

one week at the end of the semester. 1 credit.

Students should be prepared for overnight camping and will have to pay for their own meals.

W. A. Bassett.

Field mapping methods, mineral and rock identification, examination of Precambrian metamorphic rocks and lower Paleozoic sediments, talc and zinc mines.

**[704 Western Field Course** Spring. 6 credits

Prerequisites: four courses in geological sciences at the 300 level and permission of instructor. Students should be prepared for overnight camping and will have to pay for their own meals. Not offered 1983-84.

Weekly rec and 35-day trip to California, Nevada, and Utah. Staff.

A comparative study of California Coast Range, Sierra Nevada, Basin and Range of Nevada, and Uinta Mountains, Utah. Pretrip seminars and extensive reading at Cornell. Study of Mesozoic ophiolites, and subduction near San Luis Obispo, California; recent earth movements along the San Andreas Fault near San Francisco; granitic pluton emplacement and volcanism in the northern Sierra Nevada; multiple-phase mountain building near Dixie Valley, Nevada; sedimentology and block faulting of the Uinta Mountains, Utah. Five-day raft trip on the Green River through the core of the Uinta mountains. Visit to an oil field in California and a mine in Nevada. Lectures and field trips with local experts.]

## Materials Science and Engineering

### Undergraduate Courses

**122 Composite Materials: Design and Applications (also Engr 122)** Fall. 3 credits.

2 lecs, 1 lab or rec.

For description see Engineering Common Courses.

**201 Elements of Materials Science (also Engr 111)** Fall, spring. 3 credits.

Autotutorial.

For description see Engineering Common Courses.

**261 Introduction to Mechanical Properties of Materials (also Engr 261)** Fall, spring. 3 credits.

2 lecs, 1 rec or lab.

For description see Engineering Common Courses.

**262 Introduction to Electrical Properties of Materials (also Engr 262)** Spring. 3 credits.

2 lecs, 1 rec or lab.

For description see Engineering Common Courses.

**331 Structural Characterization and Properties of Materials** Fall. 4 credits.

3 lecs, 1 lab.

Crystal structures and crystal defects, stereographic methods. Binary-alloy structures, phase transitions, precipitation hardening, T-T-T diagrams in iron-carbon system. Structure and transitions of amorphous and partially ordered materials.

Techniques for materials analysis: X-ray and electron diffraction, optical and electron microscopy. Implications for the design of materials with useful engineering properties.

**332 Electrical and Magnetic Properties of Materials** Spring. 3 credits.

3 lecs.

Electrical and magnetic properties of metals and semiconductors as affected by microstructure. Design of semiconductor properties by doping. Carrier drift, diffusion, and recombination. Depletion layers in p-n junctions. Semiconductor devices and their optimized design. Principles and design of ferromagnetic materials for transformers, permanent magnets, and bubble memories. Fundamentals and design of superconducting materials for high-field magnets and Josephson junctions.

**333 Research Involvement I** Fall. 3 credits

Prerequisite: approval of department.

Semi-independent research project in association with faculty member and faculty research group of the department. Students design equipment and/or experiments and evaluate results. Creativity and synthesis are emphasized. Typical projects have involved hot isostatic compaction, sputter etching, mechanical testing of polymer films, and relation of properties to microstructure.

**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.

**335 Thermodynamics of Condensed Systems**

Fall. 3 credits.

3 lecs.

The three laws of thermodynamics are introduced as a basis for understanding phase equilibria, heterogeneous reactions, solutions, electrochemical processes, surfaces, and defects. Examples of design and control of materials processing and microstructure are discussed.

**336 Kinetics, Diffusion, and Phase Transformations** Spring. 3 credits.

3 lecs.

Introduction of absolute rate theory, atomic motion, and diffusion. Applications to 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.

**345 Materials and Manufacturing Processes**

(also M&AE 311) Fall, spring. 3 credits. May be taken in addition to MS&E 261. Prerequisite: T&AM 202 or permission of instructor.

2 lecs, 1 lab.

For description see M&amp;AE 311.

**441 Microprocessing of Materials** Fall. 3 credits.

3 lecs, occasional lab.

Introduction to engineering and design of large-scale integrated circuits. All the major processing steps involved in fabrication are considered. Metallurgical processes for winning high-purity silicon from  $\text{SiO}_2$ , single-crystal growth, zone melting and zone refining, Burton-Prim-Schlichter theory of the effective distribution coefficient, epitaxial growth of silicon. Thermal oxidation of silicon to form  $\text{SiO}_2$ , mathematical theory of solid-state diffusion with specific application to the doping of silicon to form integrated circuit devices; e.g., resistors, diodes, and bipolar transistors. Evaluation of diffused layers by electrical measurements. Linhard-Scharrf-Schott theory of ion implantation; stopping power, electronic and nuclear energy-loss mechanisms, range and damage profiles. Application of ion implantation to the fabrication of the MOSFET (metal-oxide semiconductor field-effect transistor.) Etching, metallization, photoresists, metal-semiconductor contacts, failure due to electromigration effects.

**442 Macroprocessing** 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.

**443-444 Senior Materials Laboratory** 443, fall; 444, spring. 3 credits.

Projects are available in plasticity of metals and ceramics, mechanical and chemical processing, phase transformations, electrical and ionic conductivity, analysis of defects by electron microscopy, sintering, crystal growth, etc. Emphasis is placed on analysis and evaluation of a material's properties and performance in terms of its processing history and microstructure.

**445 Mechanical Properties of Materials** Fall. 3 credits.

3 lecs.

Relation between stress, strain, concept of equivalent stresses and strains; failure criteria for metals, polymers, and ceramics. Applications of fracture mechanics to fail-safe design. Analysis of important mechanical properties such as plastic flow, creep, fatigue, fracture toughness, and rupture, and their variation with temperature in terms of the interaction of the microstructure with lattice defects. Application of these principles to the design of improved materials.

**446 Current Topics in Materials** Spring. 3 credits.

3 lecs.

Speakers from industry and other institutions will give case studies of design problems. Each student is expected to research and write an extensive term paper and give a fifty-minute talk on a materials-design problem involving economic factors.

**447 Introduction to Ceramics** Fall. 3 credits.

Prerequisite: MS&E 261 or permission of instructor. Offered alternate years.

3 lecs.

Engineering applications of ceramic materials and processes. Crystal structure and ionic bonding of ceramic materials; structure of glasses; point defects, point-defect chemistry and relation to nonstoichiometry; line defects and grain boundaries; diffusion in stoichiometric and nonstoichiometric oxides; phase diagrams; phase transformations and the design of glass-ceramics; grain growth and sintering.

**448 Properties of Solid Polymers** Spring. 3 credits.

3 lecs.

Synthetic and natural polymers for engineering applications. Production and characterization of long-chain molecules. Gelation and networks, rubber elasticity, design of elastomers and thermosetting resins. Amorphous and crystalline thermoplastics and their structure. Time- and temperature-dependent elastic properties of polymers. Plastic deformation and fracture. Design of high-impact-strength polymers. Fiber drawing and fiber properties.

**450 Physical Metallurgy** Spring. 3 credits.

The service and design requirements of engineering alloys, the testing and characterization of materials, and the properties of important alloy systems. The selection and design of alloys for various engineering requirements, such as ASME design codes.

**452 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.

**455 Analysis of Manufacturing Processes (also M&AE 512)** Spring. 3 credits. Prerequisite: M&AE 311.

3 lecs.

For description see M&amp;AE 512.

**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 necessary for understanding techniques of modern materials analysis, such as Auger electron spectroscopy, ion scattering, and secondary ion mass spectroscopy.

**Graduate-Level Professional Courses****553-554 Special Project** 553, fall; 554, spring. 6 credits each term.

Research on a specific problem in the materials area.

**Graduate Core Courses****601 Thermodynamics of Materials** Fall. 3 credits.

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.

**602 Elasticity and Physical Properties of Crystals** Fall. 3 credits.

Cartesian tensors, elastic stress and strain, constitutive relations between stress and strain, symmetry of crystals, generalized tensor representation of elasticity and other reversible and irreversible properties of crystals, mathematical theory of infinitesimal elasticity with applications, including wave propagation and stress fields of dislocations, mathematical theory of yield stress and plasticity, origin of elastic behavior, including rubberlike behavior. At the level of *Physical Properties of Crystals*, by Nye.

**603 Structural Defects in Solids** Spring. 3 credits.

Prerequisites: MS&E 601 and 602, or equivalent.

Binding energies in perfect crystals. Structure and energetics of point, line and planar defects in crystalline materials, including metals, ionic solids, covalent solids, and polymers. Interactions between defects. Bonding and random packing in amorphous materials. Observation of defects in crystalline materials. Structural analysis of amorphous materials.

**604 Kinetics of Solid-State Reactions** Spring 3 credits.

Elements of irreversible thermodynamics. General flux-force relationships. Material transport due to gradients in concentration, temperature, electrical potential, etc. Reaction-rate theory. Mechanisms of diffusion in solids and liquids. Role of defects.



Transport at interfaces. Diffusion in alloys. Kinetics of phase transformation in solids. Mechanisms of oxidation. Crystal growth from vapor and liquid. Reactions produced by irradiation.

**605 Plastic Flow and Fracture of Materials** Fall 3 credits.

Experimental and theoretical aspects of the deformation and failure of structural materials. Although the emphasis is on metals and alloys, consideration is given also to glasses, ceramics, and polymeric materials. Some of the topics included are theory and practice of mechanical testing, deformation behavior of polycrystal and single-crystal metals, phenomenological theories of deformation, micromechanical theories of plastic flow and creep, relationship of microstructure to mechanical properties, brittle and ductile fracture of materials.

**Related Course in Another Department**

**Introductory Solid-State Physics (Physics 454)**

**Further Graduate Courses**

**[610 Principles of Diffraction (also A&EP 711)]** Fall. 3 credits. Offered alternate years. Not offered 1983-84.

Introduction to diffraction phenomena as applied to solid-state problems. Scattering and adsorption of neutrons, electrons, and X-ray beams. Particular emphasis on synchrotron radiation X-ray sources. Fourier representation of scattering centers, and the effect of thermal vibrations. Phonon information from diffuse X-ray and neutron scattering and Bragg reflections. Diffraction from almost-periodic structures, surface layers, gases, and amorphous materials. Survey of dynamical diffraction from perfect and imperfect lattices.]

**612 Phase Transformations** 3 credits.

Prerequisite: MS&E 601 and 603 or equivalent preparation.

Compositional and structural transitions in condensed systems, including spinoidal decomposition, cellular transformations, and diffusionless transformations; clustering and ordering in solid solutions; radiation-induced precipitation; condensation and evaporation phenomena; order-disorder transformations; transitions in magnetic, ferroelectric, and superconducting materials; phase equilibria and transitions in surface and grain-boundary layers. Phase transformations in metallic, ceramic, semiconducting, and polymeric systems. Thermodynamic, statistical thermodynamic, structural, and kinetic aspects of the transitions. Modern methods of observation. At the level of *The Theory of Transformations in Metals and Alloys*, by Christian; *Critical Phenomena in Alloys, Magnets and Superconductors*, edited by Mills, Ascher, and Jaffee; and current review articles.

**614 Electron Microscopy** 3 credits.

Electron optics, Abbe theory of image formation with applications to the direct imaging of small defects and atomic planes. Kinematical theory of diffraction with applications to the study of the structure of grain boundaries and the imaging of crystal defects. Dynamical theory of diffraction as applied to the calculation of the images of crystal defects. Instruction in the use of the microscope.

**616 Electrical and Magnetic Properties of Materials** 3 credits. Prerequisite: Physics 454 or equivalent.

Electronic transport properties of metals and semiconductors, semiconductor devices, optical and dielectric properties of insulators and semiconductors, laser materials, dielectric breakdown, structural aspects of superconducting materials, ferromagnetism and magnetic materials. At the level of *Physics of Semiconductor Devices*, by Sze; *Ferromagnetism*, by Bozworth; and current review articles.

**Specialty Courses**

**702 Amorphous and Semicrystalline Materials** 3 credits. Prerequisite: Physics 454 or equivalent.

Topics related to the science of the amorphous state, selected from within the following general areas: structure of liquids and polymers; rheology of elastomers and glasses; electrical, thermal, and optical properties of amorphous materials. Presented at the level of *Modern Aspects of the Vitreous State*, by Mackenzie; "Glass Transitions," by Shen and Eisenberg in *Progress in Solid State Chemistry*; and *The Physics of Rubber Elasticity*, by Treloar.

**[703 Solid Surfaces and Interfaces** 3 credits.

Prerequisites: MS&E 601 and some knowledge of solid-state physics. Similar to A&EP 762. Offered alternate years. Not offered 1983-84. Topics to be covered include atomic structure of surfaces, surface statistical thermodynamics, interaction of surfaces with gases, defects at surfaces, surfaces of alloys, semiconductor and insulator interfaces, heterogeneous catalysis, mass transport, oxidation of crystals.]

**704 Advanced Topics in Crystal Defects** 3 credits. Prerequisites: MS&E 601, 602, and 604, or equivalent.

The structure and properties of point, line, and planar crystal defects treated from a fundamental point of view. Thermodynamics and kinetics of point defects. Atomistic and continuum theories of dislocations. Thermodynamic treatment of grain boundaries. Structure of grain boundaries. Emphasis given throughout to interactions between the various types of defects and to their roles in important phenomena such as diffusion, precipitation, plasticity, radiation damage.

**705 The Effects of Radiation on Materials** 3 credits.

Cross section for atom displacement; orientation dependence of the threshold energy; interatomic potentials; the atomic collision cascade; focusing of atomic collisions; mass transport along collision spectra within a cascade; range concepts and measurements in polycrystalline and single-crystal metals and semiconductors; channeled particles and the effect of crystal imperfections on the range; Rutherford back-scattering and channeling and their application to the lattice location of impurity atoms; sputtering of single and polycrystalline metals; recovery mechanisms for radiation damage; void formation in metals irradiated to high fluences, and the problem of swelling in liquid-metal fast breeder reactors; the first-wall problem in controlled thermonuclear reactors. At the level of *Defects and Radiation Damage in Metals*, by M. W. Thompson; *The Observation of Atomic Collisions in Crystalline Solids*, by R. S. Nelson; *Ion Bombardment of Solids*, by G. Carter and J. S. Colligon; and selected papers and review articles.

**706 Amorphous Semiconductors** 2 credits

Prerequisite: knowledge of the theory of crystalline semiconductors on the level of Kittel. The preparation, characterization, and electronic transport of amorphous semiconductors from an experimental point of view. Particular emphasis is given to amorphous, hydrogenated Si. Some potential device applications, such as in amorphous Si solar cells and the metal-base transistor, are described.

**707 Solar Energy Materials** 3 credits.

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 JPL program to produce large quantities of solar-grade semiconducting Si.

**708 Ceramic Materials** 3 credits. Prerequisites: MS&E 601 and some familiarity with crystal structures.

Crystal structure and bonding of typical ceramic materials; structure of silicate and nonsilicate glasses; imperfections in oxides; point defects and point-defect chemistry, line defects, extended defects; diffusion in stoichiometric and nonstoichiometric ceramics; phase transformations; equilibrium and nonequilibrium phases; grain growth and sintering; plastic deformation and creep; topics from research papers.

**775 Advanced Topics in Mechanical Properties** 3 credits. Prerequisite: MS&E 605 or permission of instructor.

3 lecs. Topics from current research in mechanical properties of structural materials, selected from the following: Modern theories of deformation, high-strength alloys, effects of nuclear radiation, amorphous solids, cyclic deformation and fatigue, fracture of brittle and ductile solids, anelasticity and internal friction. Lectures are based largely on current literature.

**779 Special Studies in Materials Sciences** Fall, spring. Credit variable. Supervised studies of special topics in materials science.

**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.

**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.

**800 Research in Materials Science** Fall, spring.

Credit to be arranged. Prerequisite: candidacy for Ph.D. in materials science. Independent research in materials science under the guidance of a member of the staff.

**801 Research in Materials Science** Fall, spring.

Credit to be arranged. Prerequisite: candidacy for M.S. in materials science. Independent research in materials science under the guidance of a member of the staff.

**Mechanical and Aerospace Engineering**

**General and Required Courses**

**101 Naval Ship Systems (also Naval Science**

**102)** Spring. 3 credits. Limited to freshmen and sophomores.

R. L. Wehe. An introduction to primary ship systems and their interrelation. Basic principles of ship construction. stability, propulsion, control, internal communications, and other marine systems.

**102 Drawing and Engineering Design (also Engr**

**102)** Fall, spring. 1 credit. Half-term course offered twice each semester. Enrollment limited.

Recommended for students without previous mechanical drawing experience. S-U grades optional.

2 lecs, 1 lab.

For description see Engineering Common Courses.

**117 Introduction to Mechanical Engineering**

(also Engr 117) Fall. 3 credits

2 lecs, 1 lab.

For description see Engineering Common Courses.

**119 Introduction to Manufacturing Engineering**

(also Engr 119) Spring. 3 credits

2 lecs, 1 lab.

For description see Engineering Common Courses.

**221 Thermodynamics (also Engr 221)**

Fall, spring. 3 credits. Prerequisites: Mathematics 191 and 192, Physics 112. Evening prelims.

For description see Engineering Common Courses.

**[302 Technology, Society, and the Human Condition]**

Spring, summer. 3 credits. Limited to upperclass engineers and other students who have received permission of instructor. S-U grades optional. Approved social science elective. Not offered 1983-84.

B. J. Conta.

An introduction to the history of technology from the origin of man to the present. Emphasis is on the social and human consequences of technology rather than on internal or gadget history. Of primary interest are the nineteenth and twentieth centuries and the pervasive effects of industrialization—a process that began with manufacturing and was rapidly extended to agriculture, culminating in what Ivan Illich has called the industrialization of man. Among the current topics included are the transition from an economy of abundance and affluence to one of impending shortages and limits to growth, alternative life styles, alternative energy sources and systems; and the growing interest in intermediate or appropriate technology.]

**311 Materials and Manufacturing Processes**

(also MS&amp;E 345) Fall, spring; may be offered in Engineering Cooperative Program. May be taken in addition to Engr 261. Enrollment limited to 80 students per term: upperclass mechanical engineering and materials science students have priority. Prerequisite: Engr 202 or permission of instructor. Evening prelims may be given.

2 lecs, 1 lab. M. C. Leu.

Material structures. Physical and metallurgical properties of materials and their control by mechanical and metallurgical means. Manufacturing processes. Emphasis on correlations among design, material properties, and processing methods.

**323 Introductory Fluid Mechanics**

Fall; usually offered in Engineering Cooperative Program. 4 credits. Prerequisites: Engr 202, 203, and 221, or permission of instructor.

4 recs. Evening prelims. Z. Warhaft.

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.

**324 Heat Transfer**

Fall, spring; not offered fall 1984; may be offered in Engineering Cooperative Program. Prerequisite: M&amp;AE 323.

2 lecs, 1 rec. Evening prelims.

Conduction of heat in steady and unsteady situations. Fin surfaces 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. Multimode heat transfer.

**325 Mechanical Design and Analysis**

Fall, spring; usually offered in Engineering Cooperative Program. 4 credits. Prerequisites: Engr 202 and 203.

3 recs, 1 lab. R. M. Phelan.

Application of the principles of mechanics and materials to problems of analysis and design of mechanical components and systems.

**326 Systems Dynamics**

Fall (seniors only), spring; not offered fall 1984; may be offered in Engineering

Cooperative Program. 4 credits. Prerequisite:

M&amp;AE 325.

Evening prelims.

Dynamic behavior of mechanical systems, modeling, analysis techniques and applications, digital- and analog-computer simulation, balancing of rotating and reciprocating machinery, vibrations of single and multi-degree-of-freedom systems, linear control systems. PDF control, stability analysis.

**327 Mechanical Engineering Laboratory**

Fall. 4 credits. Prerequisites: M&amp;AE 323, 325, and concurrent registration in M&amp;AE 324 and 326.

1 lec, 2 labs. A. R. George, E. L. Resler, Jr.,

D. G. Shepherd, K. E. Torrance.

Laboratory exercises in instrumentation, techniques, and methods in mechanical engineering.

Measurements of pressure, temperature, heat flow, drag, fluid-flow rate, solar energy, thermoelectricity, displacement force, stress, strain, vibrations, noise.

**Mechanical Systems and Design and Manufacturing****464 Design for Manufacture**

Fall. 3 credits. Prerequisites: M&amp;AE 311 and 325, or permission of instructor.

R. L. Wehe.

Design for casting, forging, stamping, welding, machining, heat treatment, and assembly; beneficial prestressing; improving the distribution of loads and deflections. Selection of materials; dimensioning and fits; joints, fasteners, and shaft mountings. Specifications for manufacturing and maintenance to minimize fatigue failures and improve reliability. Short design problems.

**483 Mechanical Reliability**

Fall. 3 credits.

Prerequisites: Engr 260 or 270 or equivalent.

S. L. Phoenix.

Classic system reliability, hazard-function concepts, reliability bounds; static and time-dependent material-strength models, weakest-flaw models; structural system reliability, static and time-dependent parallel-member models. Monte Carlo simulation of structural systems with load sharing. Strength of composite materials.

**486 Automotive Engineering**

Spring. 3 credits.

Prerequisite: M&amp;AE 325.

R. L. Wehe.

Selected topics in the analysis and design of vehicle components and vehicle systems. Emphasis is on automobiles, trucks, and related vehicles. Powerplant, driveline, brakes, suspension, and structure. Other vehicle types may be considered.

**489 Computer-aided Design**

Spring. 3 credits.

Limited to juniors and seniors.

2 lec-recs, 1 computing lab; term project.

D. L. Taylor.

A broad introduction to computational methods in mechanical design. Problems with emphasis on interactive techniques.

**512 Analysis of Manufacturing Processes (also****MS&E 455)** Spring. 3 credits. Prerequisite: M&AE 311.

3 lecs. P. R. Dawson.

Review of basic principles of plasticity with coverage of bound theorems and slipline theory. Analytical treatment of metal-cutting and metal-forming processes; conventional and nontraditional manufacturing methods; production systems and machine tool dynamics.

**513 Materials Engineering**

Spring, on demand. 3

credits. Prerequisite: M&amp;AE 311, Engr 261, or

permission of instructor.

Designed to aid in the design, selection, and use of engineering materials. Theory and practice of extractive, physical, and mechanical metallurgy. Corrosion principles and control; metallurgical failure analysis and prevention; mechanical properties of polymers, ceramics, and composite materials.

**514 Numerical Control in Manufacturing**

Fall. 3 credits. Prerequisite: upperclass standing in engineering.

3 lecs. K. K. Wang.

Principles and the state of the art of numerical control (NC) technology; programming methods for NC and computerized NC (CNC) machine tools with laboratories; economic aspects, and roles in computer-aided design/computer-aided manufacturing (CAD/CAM) systems with graphics.

**517 Introduction to Industrial Robots**

Spring. 3

credits. Enrollment limited; intended for graduate students; open to qualified undergraduates with permission of instructor. Prerequisite: background in vector calculus, rigid body dynamics, and feedback control.

M. C. Leu.

Use of homogeneous coordinate transformations to solve manipulator kinematic equations. Motion trajectories in joint and Cartesian coordinates. Derivation of dynamic equations using Newtonian and Lagrangian formulation schemes. Feedback control of robot motion using conventional and modern schemes. Robotic sensors for part recognition and servo control. Geometric modeling and robot simulation.

**[563 Mechanical Components]**

Spring. 3 credits.

Prerequisite: M&amp;AE 325. Not offered 1983-84.

Advanced analysis of machine components and structures. Application to the design of new configurations and devices. Selected topics from the following: lubrication theory and bearing design, fluid drives, shells, thick cylinders, rotating disks, fits, elastic-plastic design, thermal stresses, creep, impact, indeterminate and curved beams, plates, contact stresses.]

**[565 Biomechanical Systems—Analysis and****Design]** Fall. 3 credits. Prerequisites: Engr 202 and 203. Not offered 1983-84.

3 recs; term project. 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 orthopedic surgery and physical rehabilitation.]

**569 Mechanical and Aerospace Structures I**

Fall. 3 credits. Prerequisite: M&amp;AE 325 or permission of instructor.

J. F. Booker.

A study of advanced topics in the analysis of stress and deformation of deformable bodies, with applications to the analysis and design of mechanical and aerospace systems. Topics selected from advanced strength of materials, energy methods in stress analysis, strength theories, and experimental stress analysis.

**575 Microprocessor Applications**

Fall. 3 credits.

Enrollment limited; intended for graduate students with limited background in digital circuitry; open to undergraduates with permission of instructor. Prerequisite: background in basic laboratory electronics.

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 AIM-65 microcomputer and 6502 assembly language programming. Independent laboratory work on several applications projects, including the design of a digital voltmeter and stepper-motor control.

**577 Mechanical Vibrations**

Spring. 3 credits.

Open to qualified undergraduates. Prerequisite:

M&amp;AE 326 or equivalent.

2 recs, 1 lab. R. M. Phelan.

Further development of vibration phenomena in single-degree- and multi-degree-of-freedom linear and nonlinear systems, with emphasis on engineering problems involving analysis and design.

**578 Feedback Control Systems** Fall, 3 credits. Open to qualified undergraduates. Prerequisite: M&AE 326 or permission of instructor. 2 recs, 1 lab. R. M. Phelan.

Further development of the theory and implementation of feedback control systems, with particular emphasis on the application of pseudo-derivative-feedback (PDF) control concepts to the design and operation of linear and nonlinear systems.

**587 Dynamics of Vehicles** Fall, offered on demand. 3 credits. Prerequisite: Engr 203. Introduction to the dynamics of ground vehicles including cars, trucks, trailers, motorcycles, and railroad vehicles. Emphasis is on the handling behavior and stability of the automobile, tire theory, and suspension analysis. Performance and comfort criteria are developed. Further topics are included to reflect interests of the class.

**[616 Finite-Element Methods in Thermomechanical Processes]** Fall, 4 credits. Prerequisites: introductory course work in finite-element methods and elasticity or in analysis of manufacturing processes. Not offered 1983-84.

P. R. Dawson. Application of finite-element methods in the analyses of mechanical deformation processes that are nonlinear and influenced by coupling to thermal or electrical behavior. Elastic, elastoplastic, viscoplastic, and thermally coupled analyses applied to problems in large deformation, bulk forming, polymer flows, and welding.]

**670 Mechanical and Aerospace Structures II** Spring, 4 credits. Prerequisite: M&AE 569 or permission of instructor. P. R. Dawson.

Introduction to modern computational methods for elastic and thermal analysis of mechanical and aerospace structures. Emphasis on underlying mechanics and mathematics. Discussion of basic components and organization of finite-element programs. Selected engineering applications. Computing projects.

**672 Experimental Methods in Machine Design** Fall, on demand. 4 credits. Prerequisite: M&AE 325 or equivalent.

1 rec, 2 labs. Investigation and evaluation of methods used to obtain design and performance data. Photoelasticity, strain measurement, photography, vibration and sound measurements, transducers.

**676 Advanced Mechanical Vibrations** Fall, on demand. 4 credits. Prerequisite: M&AE 577 or equivalent.

D. L. Taylor. Vibratory response of multi-degree-of-freedom systems, matrix formulation, concepts of impedance, mobility, frequency response, and complex-mode shapes. State-of-the-art techniques such as FFT, sine sweep, and single-point random excitation. Nonlinear vibrations, limit-cycle analysis, parametric resonance, self-excited oscillations, and nonconservative systems. Random vibrations and stochastic excitation. Introduction to vibrations of elastic bodies.

**679 Digital Simulation of Dynamic Systems** Spring, 4 credits. Open to qualified undergraduates who have permission of instructor. Prerequisite: previous exposure to systems dynamics and digital programming. Offered alternate years.

J. F. Booker. Modeling and representation of physical systems by systems of ordinary differential equations in state vector form. Applications from diverse fields. Simulation diagrams. Analog and digital simulation by direct integration. Problem-oriented digital-simulation languages (e.g., CSMP). Digital analysis of stability and response of large linear systems.

**682 Hydrodynamic Lubrication: Fluid-Film Bearings** Fall, on demand. 4 credits. J. F. Booker.

Designed to acquaint those having a general knowledge of solid and fluid mechanics with the special problems and literature currently of interest in various fields of hydrodynamic lubrication. General topics include equations of viscous flow in thin films, self-acting and externally pressurized bearings with liquid and gas lubricant films, bearing-system dynamics, and computational methods. Also selected special topics such as elastohydrodynamic lubrication.

**684 Advanced Mechanical Reliability** Fall, on demand. 4 credits. Prerequisite: M&AE 483 or permission of instructor. S. L. Phoenix.

Advanced course in random loading and statistical failure processes in mechanical systems. Continuous and discrete random loadings; random vibrations of mechanical structures; random fatigue processes in materials; order statistics and statistical estimation of reliability, simulation, and computation in mechanical structures; coherent systems and monotone load-sharing, stochastic failure of bundles and composites.

**[685 Optimum Design of Mechanical Systems]** Fall, 4 credits. Prerequisite: graduate standing or permission of instructor. Not offered 1983-84. 3 recs. D. L. Bartel.

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.]

## Energy, Fluids, and Aerospace Engineering

**405 Introduction to Aeronautics** Fall, 3 credits. Limited to upperclass engineers; others with permission of instructor.

D. A. Caughey. 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.

**[439 Acoustics and Noise]** Spring, 3 credits. Prerequisite: some knowledge of fluid mechanics or permission of instructor. Not offered 1983-84.

A. R. George. Hearing, music, noise, and noise-control criteria. Sound propagation, transmission, and absorption. Sound radiation by surfaces and flow. Loudspeakers. Room acoustics and noise-control techniques.]

**441 Advanced Thermodynamics with Energy Applications** Spring, 3 credits. Prerequisite: M&AE 221 and 323 or permission of instructor.

E. L. Resler, Jr. Review of thermodynamics. Applications to phase changes, heat engines, and combustion. Magnetohydrodynamic and ferrocatalytic power generation. Statistical basis of thermodynamic laws and applications to lasers and semiconductors.

**449 Combustion Engines** Fall, 3 credits. Prerequisite: Engr 221 and concurrent registration in M&AE 323.

E. L. Resler, Jr. Introduction to combustion engines with emphasis on application of thermodynamics and fluid dynamics. Air-standard analyses, chemical equilibrium, ideal-cycle analyses, deviations from ideal processes. Combustion knock. Formation and control of undesirable exhaust emissions.

**506 Aerospace Propulsion Systems** Spring, 3 credits. Prerequisite: M&AE 323 or permission of instructor. Offered alternate years.

3 lec. D. G. Shepherd. Application of thermodynamics and fluid mechanics to design and performance of thermal-jet and rocket engines. Mission analysis in space. Auxiliary power supply; study of advanced methods of space propulsion.

**[507 Dynamics of Flight Vehicles]** Spring, 3 credits. Prerequisites: M&AE 405 and Engr 203 or permission of instructor. Offered alternate years. Not offered 1983-84.

D. A. Caughey. 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 and transient control response. At the level of *Dynamics of Flight: Stability and Control*, by Etkin.]

**530 Fluid Dynamics** Fall, 3 credits. Prerequisite: M&AE 323; senior or graduate standing, or permission of instructor.

F. K. Moore. Inviscid fluid dynamics and aerodynamics, including incompressible 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.

**531 Boundary Layers** Spring, 3 credits. Prerequisite: M&AE 323; senior or graduate standing or permission of instructor. Recommended: M&AE 530 or equivalent.

Z. Warhaft. Navier-Stokes equations for laminar and turbulent flows. Boundary layers, laminar and turbulent; skin friction, separation and transition. Jets and wakes, if time allows.

**536 Turbomachinery and Applications** Spring, 3 credits. Prerequisite: M&AE 323 or equivalent.

3 lec. 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.

**543 Combustion Processes** Spring, 3 credits. Prerequisites: M&AE 323, 324

3 recs. S. B. Pope. 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. Both premixed and diffusion flames are considered.

**554 Solar Energy** Fall, 3 credits. Prerequisite: Engr 221 or equivalent.

B. J. Conla. Fundamentals of solar radiation. Direct solar radiation as a source of heat and electrical energy. The indirect uses of solar radiation; water wind, and biomass. Applications to architecture and environmental control by both active and passive means. Industrial uses of solar energy and the production of liquid and gaseous fuels. Economics and systems analysis.

**[555 Direct Energy Conversion and Storage]** Spring, on demand 3 credits. Prerequisite: Engr 221 or equivalent. Not offered 1983-84.

3 lec. Primarily a survey of methods for the direct conversion of heat into electrical energy, with emphasis on efficiency, maximum power, practical applications, and limitations. Thermoelectric generators and refrigerators. Thermionic generators. Solar cells. Batteries. Fuel cells.]

**556 Power Systems** Fall, 3 credits. Prerequisite: M&AE 323 or equivalent.

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.

**559 Introduction to Controlled Fusion: Principles and Technology (also 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 lcs. P. L. Auer.

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.

**601 Foundations of Fluid Dynamics and Aerodynamics** Fall. 4 credits. Prerequisite: graduate standing or permission of instructor.

J. L. Lumley.

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 for compressible fluids. Vorticity dynamics. Inviscid limits of the equations of motion. Shock and contact discontinuities, conservation laws. Laminar and turbulent flows.

**602 Incompressible Aerodynamics** Spring. 4 credits. Prerequisite: M&AE 601 or equivalent. Open to qualified undergraduates with permission of instructor.

S. Leibovich.

Basic equations for inviscid fluid motion. Vorticity and general Biot-Savart law. Irrotational flows and consequences of Green's theorem. Solution methods based on singularities. Complex variable technique for two-dimensional flows. Airfoil, wing, and slender-body theories. Unsteady phenomena.

**603 Compressible Aerodynamics** Fall. 4 credits. Prerequisite: M&AE 601 or equivalent or permission of instructor.

S. Leibovich.

Basic conservation laws and fundamental theorems of compressible fluid flow. Shock waves, method of characteristics, wave interactions. Perturbation theories and similarity rules. Linearized supersonic flow, wing theory, wave drag. Nonlinear theories of transonic and supersonic flow.

**608 Physics of Fluids I** Fall. 4 credits.

P. C. T. de Boer.

Kinetic theory of gases: transport properties; derivation of the macroscopic equations of mass, momentum, and energy; flow of rarefied gases. Statistical mechanics of gases: method of the most probable value, Darwin-Fowler method of mean values, law of mass action. Introduction to wave mechanics: harmonic oscillation, rigid rotator, one-electron atom. Atomic and molecular structure: building-up principle, Born-Oppenheimer approximation. Chemical reaction rate theory.

**609 Physics of Fluids II** Spring, on demand. 4 credits.

Molecular structure bonding theory, heats of reaction. Atomic and molecular spectroscopy, applications to pollution. Nonequilibrium statistical mechanics; Boltzmann equation, H-theorem, review of Hilbert-Enskog-Chapman theory, fluctuations. Onsager's relations. Radiative transfer, lasers. At the level of *The Dynamics of Real Gases*, by Clarke and McChesney.

**610 Gasdynamics** Spring, on demand. 4 credits. E. L. Resler, Jr.

A survey of the nonlinear theory of characteristics as applied to two-dimensional steady supersonic flows and one-dimensional unsteady flows. The role of

chemical reactions in these flows is treated, as well as experimental techniques to measure chemical reaction rates. Among the topics treated are heat-capacity lag and its effects on acoustics, gasdynamic lasers, and shock-tube techniques. Magneto-acoustics and magnetically driven shock waves are also covered.

**[630 Atmospheric Turbulence and Micrometeorology** Spring. 4 credits. Offered alternate years. Open to qualified undergraduates with permission of instructor. Not offered 1983-84.

Z. Warhaft.

Basic problems associated with our understanding of the structure of the velocity field and the transport of scalars such as temperature and moisture in the lower atmosphere, from both theoretical and experimental viewpoints. Topics include the second-order turbulence equations and their closure; Monin-Obukhov theory; diffusion of scalars; spectral characteristics of atmospheric variables; experimental techniques, including remote sensing; and the analysis of random-time series.]

**[648 Seminar on Combustion** Spring. 4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1983-84.

3 recs.

Discussion of contemporary problems in combustion research with emphasis on applications of modern experimental and analytical techniques. Typical problems include formation and removal of pollutants in combustion systems, combustion of alternative fuels, coal combustion, and combustion in turbulent flow.]

**[650 Transport Processes I** Fall. 4 credits.

Prerequisite: graduate standing or permission of instructor. Not offered 1983-84.

Advanced treatment of heat conduction and thermal radiation. Differential and integral conduction equations. Exact and approximate solutions; superposition; phase-change boundaries. Radiative transport equation and Kirchhoff's laws. Emission and scattering by real surfaces and by gases. Heat exchange in enclosures.]

**651 Transport Processes II** Spring 4 credits.

Prerequisite: graduate standing or permission of instructor.

K. E. Torrance.

Advanced convection heat transfer. Integral and differential formulations. Basic equations reasoned in detail. Exact and approximate solutions. Forced convection. Natural convection. Laminar and turbulent flows. Effects of viscous dissipation and mass transfer.

**652 Boiling and Two-Phase Flow** Spring. 4

credits. Prerequisite: graduate standing or permission of instructor.

C. T. Avedisian.

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. Convective boiling and condensation. Industrial applications.

**653 Experimental Methods in Fluid Mechanics, Heat Transfer, and Combustion** Fall. 4 credits.

2 lcs, 1 lab. F. C. Gouldin.

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.

**704 Viscous Flows** Fall, on demand. 4 credits.

Prerequisite: M&AE 601 or permission of instructor.

S. F. Shen.

A systematic study of laminar flow phenomena (including compressibility and heat transfer) and

methods of analysis. Exact solutions of the Navier-Stokes equations. Linearized problems; flow at small Reynolds numbers, laminar instability. The boundary-layer approximation; general properties.

Transformations for compressibility and axisymmetric effects. Approximate methods of calculation. Separation and unsteady problems. Stability of laminar flows.

**707 Aerodynamic Noise Theory** Offered on demand. 4 credits. Prerequisite: M&AE 601 or permission of instructor.

Advanced topics in acoustics relevant to aerodynamic and transportation noise sources and control. Random processes. Geometrical acoustics in inhomogeneous moving media. Kirchhoff and Poisson formulas, diffraction, scattering. Lighthill-Curle formulations for sound generation. Absorption and transmission in fluids and at boundaries. Applications to aerodynamic noise sources.

**732 Analysis of Turbulent Flows** Fall. 4 credits. Prerequisite: M&AE 601 or permission of instructor.

S. B. Pope

Study of methods for calculating the properties of turbulent flows. Characteristics of turbulent flows. 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, Monte Carlo solutions. Additional topics depending on time available and students' interest: turbulent reactive flows, intermittency, two-point closures. The course emphasizes comparison of theory with experimental data.

**733 Stability of Fluid Flow** Offered on demand. 4 credits. Prerequisite: graduate standing or permission of instructor.

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. Nonlinear effects: amplitude equations of Stuart-Watson type. Modulated nonlinear effects and amplitude equations of the Newell-Whitehead type. Nonlinear critical-layer dynamics.

**[734 Turbulence and Turbulent Flow** Spring. 4 credits. Prerequisite: M&AE 601 or permission of instructor. Not offered 1983-84.

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.]

**735 Dynamics of Rotating Fluids** Offered on demand. 4 credits. Prerequisite: M&AE 601 or permission of instructor.

S. Leibovich.

Review of classical fluid mechanics. Rotating coordinate systems. Linearized theory for rapidly rotating fluids. Inviscid regions, viscous layers. Spinup. Motions past objects. Waves in rotating fluids. Motions in concentrated vortices. Vortex breakdown in swirling flows. Boundary-layer interactions.

**736 Numerical Fluid Mechanics I** Fall. 4 credits. Prerequisites: graduate standing, an advanced course in continuum mechanics or fluid mechanics, and some FORTRAN programming experience.

D. A. Caughey.

Numerical methods for hyperbolic partial differential equations arising in inviscid and high-Reynolds-number fluid-flow problems. Finite-difference and finite-volume methods. Accuracy, convergence, and stability of explicit and implicit methods, including treatment of boundary conditions and grid-generation

for complex geometries. General procedures for solving the Euler equations, with a critical survey of current methods for problems of aerodynamic interest, including those that are dominantly hyperhyperbolic (such as steady transonic flows). Assigned problems are solved with a digital computer.

**737 Numerical Fluid Mechanics II** Spring 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 flow problems when convection and diffusion are both present. Finite-difference and finite-element methods; accuracy, stability, and convergence. Conservation principles. A survey and comparison of current methods for the Navier-Stokes and scalar transport equations (when diffusion is present). Emphasis on essentially incompressible flows. Applications considered include steady and transient diffusion, steady and unsteady flows with heat and mass transfer, and boundary layer processes. Assigned problems are solved with a digital computer.

**738 Nonlinear Wave Propagation** Offered on demand. 4 credits. Prerequisite: M&AE 601 or permission of instructor.

S. Leibovich.  
Mathematical treatment of nonlinear effects associated with waves in continua. Examples are taken primarily from geophysical fluid dynamics and gas dynamics. Methods of averaging, variational methods, wave interactions, and exact solutions of nonlinear evolution equations.

## Special Offerings

**393 Current Topics in Biomechanics** Fall, spring. No credit.  
D. L. Bartel.

Lecture series open to students and community at large: lectures on a common topic; reports of current research and design projects at Cornell; career and study opportunities. Lectures by Cornell faculty, graduate students, and visiting scientists.

**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.

**590 Mechanical Engineering Design** Spring. 4 credits. Intended for students in M.Eng. (Mechanical) program.  
R. L. Wehe.

Formal consideration of the complete design process (including creativity, planning, scheduling, cost analysis, management, and analytical methods) in the context of one or more specific projects carried out by the students. Projects may arise from department research interests or industrial collaboration.

**592 Seminar and Design Project in Aerospace Engineering** Fall, spring. 2 credits each term. Intended for students in M.Eng. (Aerospace) program. Study and discussion of topics of current research interest in aerospace engineering. Individual design projects.

**690 Special Investigations in Mechanical and Aerospace Engineering** Fall, spring. Credit to be arranged. Limited to graduate students.

**695 Special Topics in Mechanical and Aerospace Engineering** Fall, spring. Credit to be arranged. Prerequisite: permission of instructor.

Lecture or seminar format.  
Topics of current importance in mechanical and aerospace engineering and research. More than one topic may be taken if offered.

**791 Fluid Mechanics Research Conference** Fall, spring. 1 credit each term. For graduate students involved in research projects.  
Short presentations on research in progress by faculty and students.

**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.

**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 staff.

**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 the director.  
Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the staff.

## 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, 613, 633, 634, 636, 638, 651, and 652.

**121 Fission, Fusion, and Radiation (also Engr 121)** Fall, spring. 3 credits.  
2 lecs, 1 lab demonstration.  
For description see Engineering Common Courses.

**303 Introduction to Nuclear Science and Engineering I (also A&EP 303)** Fall. 3 credits. Prerequisite: Physics 214 or Mathematics 294. This course and NS&E 304 and 305 form a coordinated, two-term sequence 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. The sequence can also serve as a basic course for those who do not intend to continue in the field. 303 is a reasonably self-contained unit that can be taken by itself by those desiring only one term.

3 lecs.  
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.

**304 Introduction to Nuclear Science and Engineering II (also A&EP 304)** Spring. 3 credits. Prerequisite: NS&E 303.  
3 lecs.

Introduction to aspects of nuclear reactor engineering and to controlled fusion. Topics include heat-transfer and safety problems in fission reactors; principles, configurations, and engineering problems of proposed fusion reactors; radiation detection, shielding, biological effects of radiation, and materials damage.

**305 Introduction to Nuclear Science and Engineering III** Spring. 1 credit. Prerequisite: NS&E 303.

1 lec.  
A one-hour reading and lecture course providing a more extensive development of the topics in nuclear physics introduced in NS&E 303. Recommended as a supplement to 303-304 for students who plan graduate work in nuclear science or engineering.

**484 Introduction to Controlled Fusion: Principles and Technology (also EE 484 and M&AE 559)** Spring. 3 credits. Prerequisite: 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.  
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.

## Operations Research and Industrial Engineering

**115 Engineering Application of Operations Research (also Engr 115)** Fall, spring. 3 credits.  
2 lecs, 1 lab.  
For description see Engineering Common Courses.

**119 Introduction to Manufacturing Engineering (also Engr 119)** Spring. 3 credits.  
2 lecs, 1 lab.  
For description see Engineering Common Courses.

**[120 Problem Solving and Modeling (also Engr 120)]** 3 credits. Not offered 1983-84.  
For description see Engineering Common Courses.]

**260 Introductory Engineering Probability (also Engr 260)** Fall, spring. 3 credits. Prerequisite: first-year calculus.  
3 lecs.  
For description see Engineering Common Courses.

**270 Basic Engineering Probability and Statistics** Fall, spring. 3 credits. Prerequisite: first-year calculus.  
3 lecs.  
For description see Engineering Common Courses.

**320 Optimization I** Fall. 4 credits. Prerequisite: Mathematics 293 or 221.  
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.

**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. The computer is used in solving typical problems.

**350 Cost Accounting, Analysis, and Control** Fall, spring. 4 credits.  
3 lecs, 1 computing-disc.



Principles of accounting, financial reports; job-order and process cost systems—historical, and standard costs; cost characteristics and concepts for control, analysis, and decision making.

### 361 Introductory Engineering Stochastic Processes I

Fall. 4 credits. Prerequisite: OR&IE 260 or equivalent.

3 lec., 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.

### 370 Introduction to Statistical Theory with Engineering Applications

Fall, spring 4 credits. Prerequisite: OR&IE 260 or equivalent.

3 lec., 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; curve fitting.

### 410 Industrial Systems Analysis

Spring 4 credits. Prerequisites: OR&IE 350 and 370, or permission of instructor.

3 lec., 1 computing session.

Engineering economic analysis, including engineering economy, replacement, taxation effects, decision making based on economic considerations. Operations analysis, including process flow, process evaluation, procedural analysis, resource layout, methods analysis and design, work measurement, job evaluation, quality control elements. Project planning and control.

### [417] Layout and Material Handling Systems

Spring. Prerequisite: OR&IE 361. Not offered 1983-84.

2 lec., 1 rec.

Design of the layout of processes and storage areas and the material-handling system for movement of items. Typical equipment used. The functions of identification control, storage, movement, batching, merging, and dispersion. Introduction to new technologies.]

### 421 Production Planning and Control

Fall. 4 credits. Prerequisites: OR&IE 320 and 361 or permission of instructor.

3 lec.

Planning and control of large-scale production operations. Inventory control. Leveling, smoothing, and scheduling of production. Job-shop scheduling and dispatching. Demand forecasting. Economic and practical interpretation of planning and control procedures.

### 431 Discrete Models

Spring. 3 credits. Prerequisite: OR&IE 320 or permission of instructor.

3 lec-recs.

Basic concepts of graphs, networks, and discrete optimization. The use of finite mathematical techniques to model contemporary problems selected from operations research, including voting procedures and decision making, efficient and equitable allocations, energy and environment, traffic and urban systems.

### 435 Introduction to Game Theory

Fall. 3 credits.

3 lec.

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. Structure theory for games arising from complex organizations.

### 462 Introductory Engineering Stochastic Processes II

Fall. 4 credits. Prerequisite: OR&IE 361 or equivalent.

3 lec., 1 rec.

A selection of topics from the following: martingales, Markov and semi-Markov processes, optimal stopping. Examples and applications are drawn from several areas.

### 471 Applications of Statistics to Engineering Problems

Fall. 4 credits. Prerequisite: OR&IE 370 or equivalent.

3 lec., 1 rec.

Sample size calculations for one- and two-sample tests; theory of multiple linear regression and applications to problems in engineering and the sciences, including graphic and analytic techniques useful in model building; analysis of data from experiments with qualitative factors, including one-way and two-way Anova models. Use of the computer as a tool for statistics is stressed.

### 472 Statistical Decision Theory

Spring. 3 credits. Prerequisite: OR&IE 471 or equivalent.

3 lec.

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.

### 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 within some firm or institution, usually a regional organization. Opportunities in the course may be discussed with the associate director.

### 516 Case Studies

Fall. 4 credits. Only for M.Eng. students in OR&IE.

3 rec-labs.

Students are presented with unstructured problems that resemble real-world situations. Students work in project groups on the formulation of mathematical models, computer analysis of the data and models, and presentation of oral and written reports.

### 551 Advanced Engineering Economic Analysis

Spring. 4 credits. Prerequisites: OR&IE 350 and knowledge of linear programming and statistics, or permission of instructor.

3 lec., 1 rec.

The economics of production. Topics concerning economic decision making at the level of the firm include long-range planning, budgeting and control, and project investment decisions under certainty and uncertainty. Topics in industrial economics include productivity, technical change, and industrial development.

### [561] Queueing Theory and Its Applications

Fall. 3 credits. Prerequisite: OR&IE 361 or permission of instructor. Not offered 1983-84.

3 lec.

Basic queueing models. Design and control of queueing systems. Statistical inference from queueing processes. Solution techniques (including simulation). Scheduling and equipment maintenance. Highway and urban traffic networks. Analysis of computer systems.]

### 562 Inventory Theory

Spring. 4 credits. Prerequisite: OR&IE 421 or permission of instructor.

3 lec., 1 rec.

Discussion of the nature of inventory systems and their design and control. Periodic and continuous review policies for single-term and single-location problems. Multi-item and multi-echelon extensions. Dynamic and static models are discussed. Redistribution methods are analyzed. Applications are stressed.

[563] Applied Time Series Analysis Spring 3 credits. Prerequisite: OR&IE 361 and CS211, or permission of instructor. Not offered 1983-84.

2 lec., 1 rec.; final project.

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. Long-range dependence models and the related statistics are considered. As time permits, other topics such as spectral analysis, filtering, the sampling and aliasing problem, and the fast Fourier transform algorithm are discussed. Applications to economics and hydrology are emphasized. Assignments require computer work.]

### 570 Statistical Methods in Quality and Reliability Control

Spring. 3 credits. Prerequisite: OR&IE 370 or equivalent.

3 lec.

Control concepts and methods for attributes and variables; process capability analysis; acceptance sampling plans; elementary procedures for variables; acceptance-rectification procedures. Reliability concepts; exponential and normal distributions in reliability; life and reliability analysis of components and systems; redundancy.

### 580 Digital Systems Simulation

Fall. 4 credits. Prerequisites: CS 211 and OR&IE 370 or permission of instructor.

2 lec., 1 rec.

Digital computer programs to simulate the operation of complex discrete systems in time. Modeling, program organization, random number and deviate generation, simulation languages, statistical considerations; applications to a variety of problem areas.

### 599 Project

Fall, spring. 5 credits. For M.Eng. students. Identification, analysis, design, and evaluation of feasible solutions to some applied problem within the OR&IE field. A formal report and oral defense of the approach and solution are required.

### [614] Facilities Location and Design

Spring. 3 credits. Prerequisite: OR&IE 320 or 622 or permission of instructor. Not offered 1983-84.

3 lec-recs.

Formulation, analysis, and solution techniques for location and facility design problems. Applications in industrial environmental and regional areas.]

### 622 Operations Research I

Fall. 3 credits. Not open to students who have had OR&IE 320.

3 lec-recs.

Survey of deterministic models. Models are drawn from linear, mixed-integer, nonlinear, and dynamic programming. Network theory, game theory, and deterministic inventory models. Modeling and applications are stressed.

### 623 Operations Research II

Spring. 3 credits. Not open to students who have had OR&IE 361.

Prerequisite: OR&IE 260 or 270 or permission of instructor.

3 lec-recs.

Models of inventory and production control. Markov decision models, queueing theory and its applications. Simulation. Illustrative examples and problems.

### 625 Scheduling Theory

Spring. 3 credits. Prerequisite: permission of instructor

3 lec-recs.

Scheduling and sequencing problems. Single resource scheduling, parallel processing, flow shop scheduling. Methodology is drawn from dynamic and integer programming; simulation techniques and heuristic methods.

### 626 Advanced Production and Inventory Planning

Fall. 3 credits

3 lec.

Introduction to a variety of production and distribution planning problems; the development of mathematical models corresponding to these problems; a study of approaches for finding solutions.

**630-631 Mathematical Programming I and II**

630, fall; 631, spring. 3 credits each term.

Prerequisite: advanced calculus.

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. Introduction to integer and nonlinear programming and game theory.

**632 Nonlinear Programming** Fall. 3 credits.

Prerequisite: OR&IE 630.

3 lecs.

Necessary and sufficient conditions for unconstrained and constrained optima. Computational methods, including interior (e.g., penalty functions), boundary (e.g., gradient projection), and exterior (e.g., cutting plane) approaches.

**633 Graph Theory and Network Flows** Fall. 3 credits.

Prerequisite: permission of instructor.

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.

**634 Combinatorial Optimization** Spring. 3 credits.

Prerequisite: permission of instructor. Not offered 1983-84.

3 lecs.

Topics in combinatorics, graphs, and networks.

These include matching, matroids, polyhedral combinatorics, and optimization algorithms.]

**636 Integer Programming** Spring. 3 credits.

Prerequisite: OR&IE 630. Not offered 1983-84.

3 lecs.

Discrete optimization. Linear programming in which the variables are restricted to be integer-valued. Theory, algorithms, and applications. Cutting-plane methods, enumerative methods, and group-theoretic methods; additional topics are drawn from recent research in this area.]

**637 Dynamic Programming** Spring. 3 credits.

Prerequisite: permission of instructor. Not offered 1983-84.

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; discrete combination examples.]

**639 Convex Analysis** Fall. 3 credits. Prerequisite:

Mathematics 411 and 431 or permission of instructor. Not offered 1983-84.

3 lecs.

The theory of finite dimensional convex sets is developed through the study of real-valued convex functions and Fenchel duality. Separation of convex sets, polarity correspondences, recession cones, theorems of Helly and Caratheodory.]

**645 Game Theory I** Fall. 3 credits. Prerequisite:

Mathematics 411 or permission of instructor. Not offered 1983-84.

3 lecs.

The minimax theorem for two-person zero-sum games. Two-person general sum games and noncooperative n-person games; Nash equilibrium points. Cooperative n-person games; the core, stable sets, Shapley value, bargaining set, kernel, nucleolus.]

**646 Game Theory II** Fall. 3 credits. Prerequisite: OR&IE 645. Not offered 1983-84.

3 lecs.

A continuation of OR&IE 645, including in-depth treatment of some of the same topics plus such additional topics as games in extensive form, games without side payments, economic market games, and games with infinitely many players.]

**652 Advanced Inventory Control** Spring. 3 credits.

Prerequisite: permission of instructor. Not offered 1983-84.

3 lecs.

The theoretical foundation of inventory theory. Both single-item, single-location problems and multi-item, multi-echelon inventory systems are analyzed. Topics covered include a study of static and dynamic (s,S) policies under a variety of assumptions concerning the demand process and system structure, as well as computational techniques.]

**660 Applied Probability** Fall. 4 credits.

Prerequisite: advanced calculus.

3 lecs, 1 rec.

Introduction to basic probability. The sample space; events; probability. Conditional probability. Independence. Product spaces. Random variables. Important distributions. Characteristic functions. Convergence concepts. Limit theorems.

**661 Applied Stochastic Processes** Spring. 4 credits.

Prerequisite: OR&IE 660 or equivalent.

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.

**662 Advanced Stochastic Processes** Fall. 3 credits.

Prerequisite: OR&IE 661 or equivalent. Not offered 1983-84.

3 lecs.

A selection of topics from the following: stationary processes, Levy processes, diffusion processes, point processes, martingales, regenerative phenomena, stochastic calculus, weak convergence.]

**663 Time Series Analysis** Spring. 3 credits.

Prerequisite: OR&IE 660 or equivalent.

3 lecs.

Representations of stationary time series. The ARIMA models. Spectral analysis. Long-range dependence. Problems of estimation. Multivariate time series.

**664 Deterministic and Stochastic Control**

Spring. 3 credits. Prerequisite: OR&IE 661 or equivalent. Not offered 1983-84.

3 lecs.

Topics include elements of calculus of variations, Pontryagin's maximum principle, Markov decision processes, dynamic programming. Problems in filtering and prediction, production planning and inventory control, congestion phenomenon, storage models, and environmental management are discussed.]

**665 Advanced Queueing Theory** Fall. 3 credits.

Prerequisite: OR&IE 660 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.

**670 Applied Statistics** Spring. 4 credits.

Prerequisite: OR&IE 660 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.

**671 Intermediate Applied Statistics** Fall. 4 credits.

Prerequisite: OR&IE 670 or equivalent.

3 lecs, 1 rec.

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. Correlation, ridge regression. Use of the computer as a tool for statistics is stressed.

**672 Statistical Decision Theory** Fall. 3 credits.

Prerequisite: OR&IE 471 or 670 or equivalent. Not offered 1983-84.

3 lecs.

The general problem of statistical decision theory and its applications. Comparison of decision rules; Bayes, admissible, and minimax rules. Problems involving sequences of decisions over time. Use of the sample cdf and other simple nonparametric methods. Applications.]

**673 Nonparametric Statistical Analysis** Spring. 3 credits.

Prerequisite: OR&IE 670 or permission of instructor.

3 lecs.

Estimation of quantiles, cdf's and pdf's. Properties of order statistics and rank-order statistics. Hypothesis testing in one- and several-sample situations; sign tests; use of ranks for tests and estimation. Small and large sample properties of tests. Asymptotic distributions of test statistics. Testing goodness of fit.

**674 Design of Experiments** Spring. 3 credits.

Prerequisite: OR&IE 671 or permission of instructor. Not offered 1983-84.

3 lecs.

Use and analysis of experimental designs such as randomized blocks and Latin squares; analysis of variance and covariance, factorial experiments; statistical problems associated with finding best operating conditions; response-surface analysis.]

**675 Qualitative Data Analysis** Spring. 3 credits.

Prerequisite: OR&IE 671. Not offered 1983-84.

Varieties of categorical data; cross classifications and contingency tables; tests for independence; multidimensional tables and log-linear models; maximum likelihood and weighted least-squares estimation; tests of goodness of fit; analysis of incomplete tables; life tables; paired comparison experiments.]

**676 Statistical Analysis of Life Data** Fall. 3 credits.

Prerequisite: OR&IE 671 or equivalent.

Analysis of data from reliability, fatigue, and life-testing studies in engineering; also 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.

**677 Statistical Selection and Ranking Procedures**

Spring. 3 credits. Prerequisite: OR&IE 674 or permission of instructor.

3 lecs.

A study of multiple-decision problems in which a choice must be made among two or more courses of action. Major emphasis is on selection and ranking problems involving choosing the "best" category where goodness is measured in terms of a particular parameter of interest. Statistical formulations of such problems; indifference-zone, subset, and other approaches. Single-stage, two-stage, and sequential procedures. Applications. Recent developments.

**680 Simulation** Spring. 3 credits. Prerequisite:

permission of instructor.

3 lecs.

An advanced version of OR&IE 580 intended for Ph.D.-level students.

**728-729 Selected Topics In Applied Operations Research** 728, fall; 729, spring. Credit to be arranged. Current research topics dealing with applications of operations research.

**738-739 Selected Topics In Mathematical Programming** 738, fall; 739, spring. Credit to be arranged. Current research topics in mathematical programming.

**748-749 Selected Topics In Game Theory** Fall, spring. Credit to be arranged. Current research topics in game theory.

**768-769 Selected Topics In Applied Probability** 768, fall; 769, spring. Credit to be arranged. Topics are chosen from current literature and research areas of the staff.

**778-779 Selected Topics In Applied Statistics** Fall, spring. Credit to be arranged. Topics chosen from current literature and research of the staff.

**790 Special Investigations** Fall, spring. Credit to be arranged. For individuals or small groups. Study of special topics or problems.

**799 Thesis Research** Fall, spring. Credit to be arranged. For individuals doing thesis research for master's or doctoral degrees.

**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.

**893-894 Applied OR&IE Colloquium** 893, fall; 894, spring. 1 credit each term. A weekly meeting of M.Eng. students. Discussion of assigned topics; presentations by practitioners in the field.

## Theoretical and Applied Mechanics

### Basics in Engineering Mathematics and Mechanics

**202 Mechanics of Solids (also Engr 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.

**203 Dynamics (also Engr 203)** Fall, spring. 3 credits. Prerequisites: coregistration in Mathematics 294. 2 lecs, 1 rec, 4 labs each semester. Evening exams. For description see Engineering Common Courses.

**293 Engineering Mathematics (also Mathematics 293)** Fall, spring. 3 credits. Prerequisite: Mathematics 192 or 194. Evening exams (see Mathematics 293.) Partial derivatives and multiple integrals; first- and second-order ordinary differential equations with applications in the physical and engineering sciences.

**294 Engineering Mathematics (also Mathematics 294)** Fall, spring. 4 credits. Prerequisite: Mathematics 293.

Evening exams (see Mathematics 294.) Vector spaces and linear algebra, matrices, eigenvalue problems, and applications to systems of linear differential equations. Vector calculus. Boundary-value problems and introduction to Fourier series.

### Engineering Mathematics

**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.

**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.

**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.

**611 Methods of Applied Mathematics II** Spring. 3 credits. Prerequisite: T&AM 610 or equivalent. 3 lecs. Emphasis on applications. Partial differential equations, tensor analysis, calculus of variations.

**613 Methods of Applied Mathematics IIIa** Fall. 2 credits. Prerequisite: T&AM 611 or equivalent. First of an 8-credit sequence (T&AM 613, 614, 615, 616) that develops advanced mathematical techniques for engineering problems. Review of complex variable theory; conformal mapping; complex integral calculus. Nonlinear partial differential equations; general theory of characteristics.

**614 Methods of Applied Mathematics IIIb** Spring. 2 credits. Prerequisite: T&AM 613 or equivalent. Integral transforms for partial differential equations. Green's function; asymptotics, including steepest descent and stationary phase; Wiener-Hopf technique. Problems drawn from vibrations and acoustics, fluid mechanics and elasticity, heat transfer, and electromagnetics.

**615 Methods of Applied Mathematics IVa** Fall. 2 credits. Prerequisite: T&AM 611 or equivalent. In context of applications; regular and singular perturbation theory, method of matched asymptotic expansions, two timing (method of multiple scales), WKB approximation.

**616 Methods of Applied Mathematics IVb** Spring. 2 credits. Prerequisite: concurrent registration in T&AM 614 or equivalent. In context of applications: Hilbert-Schmidt and Fredholm theories of integral equations, Wiener-Hopf equations with application to finite interval, Carleman equation and its generalization, effective approximations.

### Experimental Mechanics

**640 Experimental Mechanics** Fall. 3 credits. 1 lec. This course introduces students to the principles of measurement and experimentation in mechanics, acquaints them with some of the techniques for measuring fundamental mechanical quantities, and permits them to explore experimental topics such as the elastic, viscoelastic, and plastic response of materials; the linear and nonlinear vibration of discrete and continuous systems; and acoustic and elastic wave propagation and scattering phenomena.

### Continuum Mechanics and Inelasticity

**550 Introduction to Solid Mechanics** Fall. 3 credits. Prerequisite: T&AM 610 or equivalent. Basic concepts in solid mechanics: stress, strain, momentum balance, energy principles, material properties. An introduction to elasticity, plasticity, viscoelasticity, fracture. A foundation for advanced courses in structures and solids.

**651 Continuum Mechanics and Thermodynamics** Fall. 3 credits. Offered alternate years. Kinematics, conservation laws, the entropy inequality, constitutive equations, frame indifference, material symmetry. Simple materials and the position of classical theories in the framework of modern continuum mechanics.

**[752 Topics in Continuum Mechanics]** Spring. 3 credits. Prerequisite: T&AM 651. Offered alternate years. Not offered 1983-84. Polymer rheology using functionals or state variables. Continuum theory for rapid shear flows of granular materials. Chemically driven flows, percolation, and finite deformation in biological poro-elastic solids.]

**757 Viscoelasticity and Creep** Fall. 3 credits. Offered alternate years. Linear viscoelasticity: constitutive equations, models, differential and integral operators, Laplace transforms, complex modulus, vibrations and wave propagation, boundary-value problems. Thermoviscoelasticity. Creep: classical and modern theories, stress redistribution, boundary-value problems.

**[758 Theory of Plasticity]** Fall. 3 credits. Offered alternate years. Not offered 1983-84. Plastic stress-strain laws, yield criteria, flow rules. Work hardening. Flexure and torsion of bars. Boundary-value problems—thick cylinders, spheres, discs, general 3-D. Residual stress. Limit analysis of structures. Plane strain-slip-line theory.

### Elasticity and Waves

**574 Mechanical Vibrations and Waves** Spring. 3 credits. Two 1 1/2-hour lecs; 4 labs each semester. Review of vibrations of discrete systems, including multi-degree-of-freedom vibrations. Unified treatment of vibrations and wave phenomena in continuous elastic systems, including strings, rods, beams, membranes, and plates. Approximate methods for finding natural modes and frequencies. Dispersion and group velocity. Transient response of discrete and continuous systems.

**663 Applied Elasticity** Fall. 3 credits. Two 1 1/2-hour lecs. Thin curved bars. Plane stress and strain in cylinders; effects of pressure, rotation, and thermal stress. Small (and large) deflection theory of plates; classical, approximate, and strain-energy methods. Thin cylindrical shells. A first course in elastic deformable bodies with numerous engineering applications.

**664 Theory of Elasticity** Spring. 3 credits. Two 1 1/2-hour lecs

Analysis of stress and strain. Airy's stress function solutions using Fourier series and integrals. Torsion theory. Three-dimensional solutions. Bending of prismatic bars. Axially loaded circular cylinder and half space. All topics are illustrated by engineering applications.

**666 Fundamentals of Acoustics (also EE 442)** Spring. 3 credits.

3 lecs, biweekly labs.

Introduction to the principles and theories of acoustics. The vibrations of strings, bars, membranes, and plates; plane and spherical acoustic waves; transmission phenomena; resonators and filters; waves in solids and fluids. Application is made to sonic and ultrasonic transducers, music and noise, and architectural acoustics, and an introduction is given to the digital processing of acoustic signals. At the level of *Fundamentals of Acoustics*, by Kinsler, Frey, Coppens, and Sanders.

**[765 Mathematical Theory of Elasticity** Spring. Offered alternate years. 3 credits. Prerequisite: T&M 664. Not offered 1983-84.

The basic equations of large-deformation elasticity; solution of certain large-deformation problems. Linearization. Boussinesq-Papkovich potentials and three-dimensional problems; plane stress by method of Muskhelishvili; conformal mapping; torsion problems.]

**[768 Elastic Waves in Solids** Fall. 3 credits. Offered alternate years. Not offered 1983-84.

Two 1 1/2-hour 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-Pekeris. Thick-plate theories. Vibration of spheres. Scattering of waves and dynamic stress concentration.]

## Dynamics and Space Mechanics

**570 Intermediate Dynamics** Fall. 3 credits. Two 1 1/4-hour lecs.

Vector and matrix methods for kinematics, Lagrangian and Newtonian mechanics for particles and rigid bodies, Euler's equations for rotating bodies, central-force motion. Small vibrations and stability. Application to robotics, gyroscopes, orbital and spacecraft dynamics.

**[671 Advanced Dynamics** Spring. 3 credits. Prerequisite: T&M 570 or equivalent. Offered alternate years. Not offered 1983-94.

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 (Birkhoff's transformation); canonical transformations and Hamilton-Jacobi theory; Poisson stability and related topics from topological dynamics; Hamilton's principle for continuous systems, applications to shell dynamics.]

**[672 Celestial Mechanics (also Astronomy 579)** Spring. 3 credits. Offered alternate years. Not offered 1983-84.

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.]

**673 Mechanics of the Solar System (also Astronomy 571)** Fall. 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.

**675 Nonlinear Vibrations** Fall. 3 credits. Prerequisite: T&M 574 or equivalent. Offered alternate years.

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.

**776 Qualitative Theory of Dynamical Systems**

Spring. 3 credits. Prerequisite: T&M 675 or equivalent. Offered alternate years. Review of planar (single-degree-of-freedom) systems. The concept of dynamical systems, local and global analysis. Structural stability and bifurcations in planar systems. Center manifolds and normal forms. Discrete dynamical systems, maps and difference equations, homoclinic and heteroclinic motions, the Smale Horseshoe and other complex invariant sets. Implications for systems of dimension greater than two, 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

**491-492 Project in Engineering Science** 491, fall; 492, spring. 1 to 4 credits, as arranged. Projects for undergraduates under the guidance of a faculty member.

**796 Topics in Theoretical and Applied Mechanics—Fracture Mechanics** Fall. 3 credits.

Introduction to linear elastic fracture mechanics. Topics covered are linear elastic crack problems, crack-tip fields, stress-intensity factor, and energy-release rate. The second part of the course covers nonlinear fracture mechanics. Topics covered are small-scale yielding, J integral, crack-tip fields, elastic plastic crack solutions, analysis of crack growth, and time-dependent fracture mechanics.

**797 Topics in Theoretical and Applied Mechanics—Computer Algebra in Applied Mathematics** Fall. 2 credits. Prerequisite: T&M

610-611 or equivalent, and permission of instructor. An introduction to MACSYMA, a computer programming system that permits the exact algebraic manipulation of expressions involving polynomials and trigonometric functions, with applications to engineering analysis. The system includes symbolic differentiation and integration as well as symbolic matrix inversion. Applications will include Lagrange's and Hamilton's equations of motion, Taylor and Fourier Series solutions of differential equations, and perturbation methods for systems with a small parameter.

**798-799 Topics in Theoretical and Applied mechanics** Spring. 3 credits.

Special lectures or seminars on subjects of current interest. Topics are announced when the course is offered.

**890-990 Research in Theoretical and Applied Mechanics** Fall, spring. Credit as arranged: 1-6 credits, 890; 1-9 credits, 990. S-U grades optional. Thesis or independent research at the M.S. (890) or Ph.D. (990) level on a subject of theoretical and applied mechanics. Research is under the guidance of a faculty member.

## Faculty Roster

Abel, John F., Ph.D., U. of California at Berkeley. Prof., Civil and Environmental Engineering  
 Albright, Louis D., Ph.D., Cornell U. Assoc. Prof., Agricultural Engineering  
 Ast, Dieter G., Ph.D., Cornell U. Prof., Materials Science and Engineering  
 Auer, Peter L., Ph.D., California Inst. of Technology. Prof., Mechanical and Aerospace Engineering  
 Avedisian, C. Thomas, Ph.D., Princeton U. Asst. Prof., Mechanical and Aerospace Engineering  
 Babaoglu, O. Zalp, Ph.D., U. of California at Berkeley. Asst. Prof., Computer Science  
 Bachman, Steven B., Ph.D., U. of California at Davis. Asst. Prof., Geological Sciences  
 Ballantyne, Joseph M., Ph.D., Massachusetts Inst. of Technology. Prof., Electrical Engineering  
 Bartel, Donald L., Ph.D., U. of Iowa. Assoc. Prof., Mechanical and Aerospace Engineering  
 Bartsch, James A., Ph.D., Purdue U. Asst. Prof., Agricultural Engineering  
 Bassett, William A., Ph.D., Columbia U. Prof., Geological Sciences  
 Batterman, Boris W., Ph.D., Massachusetts Inst. of Technology. Prof., Applied and Engineering Physics  
 Bechhofer, Robert E., Ph.D., Columbia U. Prof., Operations Research and Industrial Engineering  
 Berger, Toby, Ph.D., Harvard U. Prof., Electrical Engineering  
 Billera, Louis J., Ph.D., City U. of New York. Prof., Operations Research and Industrial Engineering  
 Bird, John M., Ph.D., Rensselaer Polytechnic Inst. Prof., Geological Sciences  
 Birman, Kenneth P., Ph.D., U. of California at Berkeley. Asst. Prof., Computer Science  
 Bisogni, James J., Ph.D., Cornell U. Assoc. Prof., Civil and Environmental Engineering  
 Bitton, Dina, Ph.D., U. of Wisconsin at Madison. Asst. Prof., Computer Science  
 Blakely, John M., Ph.D., Glasgow U. (Scotland). Prof., Materials Science and Engineering  
 Bland, Robert G., Ph.D., Cornell U. Assoc. Prof., Operations Research and Industrial Engineering  
 Bloom, Arthur L., Ph.D., Yale U. Prof., Geological Sciences  
 Bolgiano, Ralph Jr., Ph.D., Cornell U. Prof., Electrical Engineering  
 Booker, John F., Ph.D., Cornell U. Prof., Mechanical and Aerospace Engineering  
 Brown, Larry D., Ph.D., Cornell U. Assoc. Prof., Geological Sciences  
 Brutsaert, Wilfried H., Ph.D., U. of California at Davis. Prof., Civil and Environmental Engineering  
 Bryant, Nelson H., M.E.E., Cornell U. Prof. Electrical Engineering  
 Buhrman, Robert A., Ph.D., Johns Hopkins U. Prof., Applied and Engineering Physics  
 Burns, Joseph A., Ph.D., Cornell U. Prof., Theoretical and Applied Mechanics  
 Cady, K. Bingham, Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Nuclear Science and Engineering  
 Capranica, Robert R., Sc.D., Massachusetts Inst. of Technology. Prof., Biophysics/Electrical Engineering  
 Carlin, Herbert J., D.E.E., Polytechnic Inst. of Brooklyn. J. Preston Levis Professor of Engineering, Electrical Engineering  
 Carter, C. Berry, Ph.D., Oxford U. (England). Assoc. Prof., Materials Science and Engineering  
 Caughey, David A., Ph.D., Princeton U. Assoc. Prof., Mechanical and Aerospace Engineering  
 Cisne, John L., Ph.D., U. of Chicago. Assoc. Prof., Geological Sciences  
 Clark, David D., Ph.D., U. of California at Berkeley. Prof., Nuclear Science and Engineering  
 Clark, Douglas S., Ph.D., California Inst. of Technology. Asst. Prof., Chemical Engineering  
 Clayton, Roderick K., Ph.D., California Inst. of Technology. Prof., Biological Sciences/Biophysics  
 Cocchetto, Joseph F., Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Chemical Engineering  
 Cohen, Claude, Ph.D., Princeton U. Assoc. Prof., Chemical Engineering

- Coleman, Thomas F., Ph.D., U. of Waterloo. Asst. Prof., Computer Science
- Constable, Robert L., Ph.D., U. of Wisconsin. Prof., Computer Science
- Conta, Bartholemew J., M.S., Cornell U. Prof., Mechanical and Aerospace Engineering
- Conway, Harry D., Sc.D., Cambridge U. (England). Prof., Theoretical and Applied Mechanics
- Conway, Richard W., Ph.D., Cornell U. Prof., Computer Science
- Cooke, J. Robert, Ph.D., North Carolina State U. Prof., Agricultural Engineering
- Cool, Terrill A., Ph.D., California Inst. of Technology. Prof., Applied and Engineering Physics
- Dalman, G. Conrad, D.E.E., Polytechnic Inst. of Brooklyn, Prof., Electrical Engineering
- Dawson, Paul R., Ph.D., Colorado State U. Asst. Prof., Mechanical and Aerospace Engineering
- deBoer, P. Tobias, Ph.D., U. of Maryland. Prof., Mechanical and Aerospace Engineering
- Delchamps, David F., Ph.D., Harvard U. Asst. Prof., Electrical Engineering
- Demers, Alan J., Ph.D., Princeton U. Assoc. Prof., Computer Science
- Dick, Richard I., Ph.D., U. of Illinois. Joseph P. Ripley Professor of Engineering, Civil and Environmental Engineering
- Donald, Athene M., Ph.D., Cambridge U. (England). Asst. Prof., Materials Science and Engineering
- Durnford, Deanna S., Ph.D., Colorado State U. Asst. Prof., Agricultural Engineering
- Dworsky, Leonard B., Ph.D., U. of Michigan. Prof., Civil and Environmental Engineering
- Eastman, Lester F., Ph.D., Cornell U. Prof., Electrical Engineering
- Everhart, Thomas E., Ph.D., Cambridge U. (England). Prof., Electrical Engineering
- Farley, Donald T., Ph.D., Cornell U. Prof., Electrical Engineering
- Fine, Terrence L., Ph.D., Harvard U. Prof., Electrical Engineering
- Finn, Robert K., Ph.D., U. of Minnesota. Prof., Chemical Engineering
- Fisher, Gordon P., Dr.E., Johns Hopkins U. Prof., Civil and Environmental Engineering
- Fleischmann, Hans-H., Doctorate, Munich Technical U. (Germany). Prof., Applied and Engineering Physics
- Frey, Jeffrey, Ph.D., U. of California at Berkeley. Prof., Electrical Engineering
- Furry, Ronald B., Ph.D., Iowa State U. Prof., Agricultural Engineering
- Gebremedhin, Kifle G., Ph.D., U. of Wisconsin. Asst. Prof., Agricultural Engineering
- George, Albert R., Ph.D., Princeton U. Prof., Mechanical and Aerospace Engineering
- Gergely, Peter, Ph.D., U. of Illinois. Prof., Civil and Environmental Engineering
- Gibbs, Allan K., Ph.D., Harvard U. Asst. Prof., Geological Sciences
- Gilbert, John R., Ph.D., Stanford U. Asst. Prof., Computer Science
- Gossett, James M., Ph.D., Stanford U. Assoc. Prof., Civil and Environmental Engineering
- Gouldin, Frederick C., Ph.D., Princeton U. Assoc. Prof., Mechanical and Aerospace Engineering
- Gries, David J., Ph.D., München Technische Hoch. (Germany). Prof., Computer Science
- Grigoriu, Mircea D., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Civil and Environmental Engineering
- Grubb, David T., Ph.D., Oxford U. (England). Asst. Prof., Materials Science and Engineering
- Gubbins, Keith E., Ph.D., U. of London (England). Thomas R. Briggs Professor of Engineering, Chemical Engineering
- Gunkel, Wesley W., Ph.D., Michigan State U. Prof., Agricultural Engineering
- Hagfors, Tor, Ph.D., U. of Oslo (Norway). Prof., Electrical Engineering
- Haith, Douglas A., Ph.D., Cornell U. Prof., Agricultural Engineering
- Hammer, David A., Ph.D., Cornell U. Assoc. Prof., Nuclear Science and Engineering
- Harriott, Peter, Sc.D., Massachusetts Inst. of Technology. Fred H. Rhodes Professor of Chemical Engineering
- Hart, Edward W., Ph.D., U. of California at Berkeley. Prof., Theoretical and Applied Mechanics/Materials Science and Engineering
- Hartmanis, Juris, Ph.D., California Inst. of Technology. Walter R. Read Professor of Computer Science
- Heath, David C., Ph.D., U. of Illinois. Assoc. Prof., Operations Research and Industrial Engineering
- Heegard, Chris, Ph.D., Stanford U. Asst. Prof., Electrical Engineering
- Holmes, Philip J., Ph.D., Southampton U. (England). Assoc. Prof., Theoretical and Applied Mechanics
- Hopcroft, John E., Ph.D., Stanford U. Prof., Computer Science
- Hui, Chung Y., Ph.D., Harvard U. Asst. Prof., Theoretical and Applied Mechanics
- Ilic-Spong, Marija, D.Sc., Washington U. Asst. Prof., Electrical Engineering
- Ingraffea, Anthony R., Ph.D., U. of Colorado. Assoc. Prof., Civil and Environmental Engineering
- Irwin, Lynne H., Ph.D., Texas A&M U. Assoc. Prof., Agricultural Engineering
- Isaacson, Michael S., Ph.D., U. of Chicago. Assoc. Prof., Applied and Engineering Physics
- Isacks, Bryan L., Ph.D., Columbia U. Prof., Geological Sciences
- Ishibashi, Isao, Ph.D., U. of Washington. Assoc. Prof., Civil and Environmental Engineering
- Jackson, Peter L., Ph.D., Stanford U. Asst. Prof., Operations Research and Industrial Engineering
- Jenkins, James T., Ph.D., Johns Hopkins U. Assoc. Prof., Theoretical and Applied Mechanics
- Jewell, William J., Ph.D., Stanford U. Prof., Agricultural Engineering
- Jirka, Gerhard H., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Civil and Environmental Engineering
- Johnson, C. Richard, Jr., Ph.D., Stanford U. Assoc. Prof., Electrical Engineering
- Johnson, Gregory, Ph.D., U. of Wisconsin at Madison. Asst. Prof., Computer Science
- Johnson, Herbert H., Ph.D., Case Inst. of Technology. Prof., Materials Science and Engineering
- Karig, Daniel E., Ph.D., U. of California at San Diego. Prof., Geological Sciences
- Karplus, Kevin, Ph.D., Stanford U. Asst. Prof., Computer Science/ Electrical Engineering
- Kaufman, Sidney, Ph.D., Cornell U. Acting Prof., Geological Sciences
- Kay, Robert W., Ph.D., Columbia U. Assoc. Prof., Geological Sciences
- Kelley, Michael C., Ph.D., U. of California at Berkeley. Prof., Electrical Engineering
- Kim, Myunghwan, Ph.D., Yale U. Prof., Electrical Engineering
- Kintner, Paul M., Ph.D., U. of Minnesota. Asst. Prof., Electrical Engineering
- Kohlstedt, David, Ph.D., U. of Illinois. Prof., Materials Science and Engineering
- Kostroun, Vaclav O., Ph.D., U. of Oregon. Assoc. Prof., Nuclear Science and Engineering
- Kramer, Edward J., Ph.D., Carnegie Inst. of Technology. Prof., Materials Science and Engineering
- Krusius, J. Peter, Ph.D., Helsinki U. of Technology (Finland). Assoc. Prof., Electrical Engineering
- Ku, Walter H., Ph.D., Polytechnic Inst. of Brooklyn. Prof., Electrical Engineering
- Kuckes, Arthur F., Ph.D., Harvard U. Prof., Applied and Engineering Physics
- Kulhawy, Fred H., Ph.D., U. of California at Berkeley. Prof., Civil and Environmental Engineering
- Kusse, Bruce R., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Applied and Engineering Physics
- Lance, Richard H., Ph.D., Brown U. Prof., Theoretical and Applied Mechanics
- Lee, Charles A., Ph.D., Columbia U. Prof., Electrical Engineering
- Leibovich, Sidney, Ph.D., Cornell U. Prof., Mechanical and Aerospace Engineering
- Leu, Ming-Chuan, Ph.D., U. of California at Berkeley. Asst. Prof., Mechanical and Aerospace Engineering
- Lewis, Aaron, Ph.D., Case Western Reserve U. Assoc. Prof., Applied and Engineering Physics
- Li, Che-Yu, Ph.D., Cornell U. Prof., Materials Science and Engineering
- Liang, Ta, Ph.D., Cornell U. Prof., Civil and Environmental Engineering
- Liboff, Richard L., Ph.D., New York U. Prof., Electrical Engineering
- Liggett, James A., Ph.D., Stanford U. Prof., Civil and Environmental Engineering
- Linke, Simpson, M.E.E., Cornell U. Prof., Electrical Engineering
- Lion, Leonard W., Ph.D., Stanford U. Asst. Prof., Civil and Environmental Engineering
- Liu, Philip L.-F., Sc.D., Massachusetts Inst. of Technology. Prof., Civil and Environmental Engineering
- Loehr, Raymond C., Ph.D., U. of Wisconsin. Prof., Agricultural Engineering
- Loucks, Daniel P., Ph.D., Cornell U. Prof., Civil and Environmental Engineering
- Lovelace, Richard V. E., Ph.D., Cornell U. Assoc. Prof., Applied and Engineering Physics
- Lucas, William F., Ph.D., U. of Michigan. Prof., Operations Research and Industrial Engineering
- Ludford, Geoffrey S. S., Sc.D., Cambridge U. (England). Prof., Theoretical and Applied Mechanics
- Ludington, David C., Ph.D., Purdue U. Assoc. Prof., Agricultural Engineering
- Luk, Franklin T.-C., Ph.D., Stanford U. Asst. Prof., Computer Science
- Lumley, John L., Ph.D., Johns Hopkins U. Willis H. Carrier Professor of Engineering, Mechanical and Aerospace Engineering
- Lynn, Walter R., Ph.D., Northwestern U. Prof., Civil and Environmental Engineering
- Lyon, George B., M.S., U. of Iowa. Assoc. Prof., Civil and Environmental Engineering
- McGuire, William, M.C.E., Cornell U. Prof., Civil and Environmental Engineering
- McIsaac, Paul R., Ph.D., U. of Michigan. Prof., Electrical Engineering
- Maxwell, William L., Ph.D., Cornell U. Prof., Operations Research and Industrial Engineering
- Mayer, James W., Ph.D., Purdue U. Francis Norwood Bard Professor of Materials Science and Engineering
- Merrill, Robert P., Sc.D., Massachusetts Inst. of Technology. Herbert Fisk Johnson Professor of Industrial Chemistry, Chemical Engineering
- Meyburg, Armin H., Ph.D., Northwestern U. Prof., Civil and Environmental Engineering
- Millier, William F., Ph.D., Cornell U. Prof., Agricultural Engineering
- Moitra, Abha, Ph.D., U. of Bombay (India). Asst. Prof., Computer Science
- Moon, Francis C., Ph.D., Cornell U. Prof., Theoretical and Applied Mechanics
- Moore, Franklin K., Ph.D., Cornell U. John C. Ford Professor of Mechanical Engineering, Mechanical and Aerospace Engineering
- Muckstadt, John A., Ph.D., U. of Michigan. Prof., Operations Research and Industrial Engineering
- Mukherjee, Subrata, Ph.D., Stanford U. Assoc. Prof., Theoretical and Applied Mechanics
- Nation, John A., Ph.D., U. of London (England). Prof., Electrical Engineering
- Nelkin, Mark S., Ph.D., Cornell U. Prof., Applied and Engineering Physics
- Nemhauser, George L., Ph.D., Northwestern U. Prof., Operations Research and Industrial Engineering
- Nichols, Benjamin, Ph.D., U. of Alaska. Prof., Electrical Engineering
- Nilson, Arthur H., Ph.D., U. of California at Berkeley. Prof., Civil and Environmental Engineering
- Olbricht, William L., Ph.D., California Inst. of Technology. Asst. Prof., Chemical Engineering
- Oliver, Jack E., Ph.D., Columbia U. Irving Porter Church Professor of Engineering, Geological Sciences
- Orloff, Neil, J.D., Columbia U. Prof., Civil and Environmental Engineering/Program on Science, Technology, and Society



- O'Rourke, Thomas D., Ph.D., U. of Illinois. Assoc. Prof., Civil and Environmental Engineering
- Pao, Yih-Hsing, Ph.D., Columbia U. Prof., Theoretical and Applied Mechanics
- Pekoz, Teoman, Ph.D., Cornell U. Prof., Civil and Environmental Engineering
- Phelan, Richard M., M.M.E., Cornell U. Prof., Mechanical and Aerospace Engineering
- Philipson, Warren R., Ph.D., Cornell U. Assoc. Prof., Civil and Environmental Engineering
- Phoenix, S. Leigh, Ph.D., Cornell U. Assoc. Prof., Mechanical and Aerospace Engineering
- Pitt, Ronald E., Ph.D., Cornell U. Asst. Prof., Agricultural Engineering
- Pollock, Clifford R., Ph.D., Rice U. Asst. Prof., Electrical Engineering
- Pope, Stephen B., Ph.D., Imperial College of Science and Technology (England). Assoc. Prof., Mechanical and Aerospace Engineering
- Pottle, Christopher, Ph.D., U. of Illinois. Prof., Electrical Engineering
- Prabhu, Narahari U., M.Sc., Manchester U. (England). Prof., Operations Research and Industrial Engineering
- Pritchard, Paul A., Ph.D., Australian National University. Asst. Prof., Computer Science
- Raj, Rishi, Ph.D., Harvard U. Prof., Materials Science and Engineering
- Rand, Richard H., Sc.D., Columbia U. Prof., Theoretical and Applied Mechanics
- Reeves, Anthony P., Ph.D., U. of Kent at Canterbury (England). Assoc. Prof., Electrical Engineering
- Rehkugler, Gerald E., Ph.D., Iowa State U. Prof., Agricultural Engineering
- Resler, Edwin L., Jr., Ph.D., Cornell U. Joseph Newton Pew, Jr., Professor of Engineering, Mechanical and Aerospace Engineering
- Rhodes, Frank H. T., Ph.D., U. of Birmingham (England). Prof., Geological Sciences
- Rhodin, Thor N., Ph.D., Princeton U. Prof., Applied and Engineering Physics
- Rodriguez, Ferdinand, Ph.D., Cornell U. Prof., Chemical Engineering
- Rosson, Joseph L., M.E.E., Cornell U. Prof., Electrical Engineering
- Roundy, Robin, Ph.D., Stanford U. Asst. Prof., Operations Research and Industrial Engineering
- Ruina, Andy L., Ph.D., Brown U. Asst. Prof., Theoretical and Applied Mechanics
- Ruoff, Arthur L., Ph.D., U. of Utah. Class of 1912 Professor, Materials Science and Engineering
- Sachse, Wolfgang H., Ph.D., Johns Hopkins U. Prof., Theoretical and Applied Mechanics
- Salton, Gerard, Ph.D., Harvard U. Prof., Computer Science
- Santner, Thomas J., Ph.D., Purdue U. Assoc. Prof., Operations Research and Industrial Engineering
- Sass, Stephen L., Ph.D., Northwestern U. Prof., Materials Science and Engineering
- Scheele, George F., Ph.D., U. of Illinois. Assoc. Prof., Chemical Engineering
- Schneider, Fred B., Ph.D., SUNY at Stony Brook. Asst. Prof., Computer Science
- Schruben, Lee W., Ph.D., Yale U. Assoc. Prof., Operations Research and Industrial Engineering
- Schuler, Richard E., Ph.D., Brown U. Assoc. Prof., Civil and Environmental Engineering/Economics
- Scott, Norman R., Ph.D., Cornell U. Prof., Agricultural Engineering
- Seidman, David N., Ph.D., U. of Illinois. Prof., Materials Science and Engineering
- Seyler, Charles E., Jr., Ph.D., U. of Iowa. Asst. Prof., Electrical Engineering
- Shen, Shan-Fu, Sc.D., Massachusetts Inst. of Technology. John Edson Sweet Professor of Engineering, Mechanical and Aerospace Engineering
- Shoemaker, Christine A., Ph.D., U. of Southern California. Assoc. Prof., Civil and Environmental Engineering
- Shuler, Michael L., Ph.D., U. of Minnesota. Assoc. Prof., Chemical Engineering
- Siegel, Benjamin M., Ph.D., Massachusetts Inst. of Technology. Prof., Applied and Engineering Physics
- Silcox, John, Ph.D., Cambridge U. (England). Prof., Applied and Engineering Physics
- Skeen, Dale, Ph.D., U. of California at Berkeley. Asst. Prof., Computer Science
- Slate, Floyd O., Ph.D., Purdue U. Prof., Civil and Environmental Engineering
- Smith, Julian C., Ch.E., Cornell U. Prof., Chemical Engineering
- Spencer, James W., Ph.D., Stanford U. Prof., Agricultural Engineering
- Spong, Mark, Ph.D., Washington U. Asst. Prof., Electrical Engineering
- Stedinger, Jerry R., Ph.D., Harvard U. Assoc. Prof., Civil and Environmental Engineering
- Steen, Paul H., Ph.D., Johns Hopkins U. Asst. Prof., Chemical Engineering
- Streett, William B., Ph.D., U. of Michigan. Prof., Chemical Engineering
- Sudan, Ravindra N., Ph.D., U. of London (England). I.B.M. Professor of Engineering, Electrical Engineering
- Tang, Chung L., Ph.D., Harvard U. Prof., Electrical Engineering
- Taqq, Murad S., Ph.D., Columbia U. Assoc. Prof., Operations Research and Industrial Engineering
- Taylor, Dean L., Ph.D., Stanford U. Assoc. Prof., Mechanical and Aerospace Engineering
- Taylor, Howard M. 3d, Ph.D., Stanford U. Prof., Operations Research and Industrial Engineering
- Teitelbaum, Ray T., Ph.D., Carnegie-Mellon U. Assoc. Prof., Computer Science
- Thomas, Robert J., Ph.D., Wayne State U. Assoc. Prof., Electrical Engineering
- Thorp, James S., Ph.D., Cornell U. Prof., Electrical Engineering
- Thorpe, Raymond G., M.Ch.E., Cornell U. Assoc. Prof., Chemical Engineering
- Todd, Michael J., Ph.D., Yale U. Prof., Operations Research and Industrial Engineering
- Torng, Hwa-Chung, Ph.D., Cornell U. Prof., Electrical Engineering
- Torrance, Kenneth E., Ph.D., U. of Minnesota. Prof., Mechanical and Aerospace Engineering
- Toueg, Sam, Ph.D., Princeton U. Asst. Prof., Computer Science
- Travers, William B., Ph.D., Princeton U. Assoc. Prof., Geological Sciences
- Treichler, John R., Ph.D., Stanford U. Assoc. Prof., Electrical Engineering
- Trotter, Leslie E., Ph.D., Cornell U. Assoc. Prof., Operations Research and Industrial Engineering
- Turcotte, Donald L., Ph.D., California Inst. of Technology. Prof., Geological Sciences
- Turnbull, Bruce W., Ph.D., Cornell U. Assoc. Prof., Operations Research and Industrial Engineering
- Turnquist, Mark A., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Civil and Environmental Engineering
- Van Loan, Charles F., Ph.D., U. of Michigan. Assoc. Prof., Computer Science
- Von Berg, Robert L., Sc.D., Massachusetts Inst. of Technology. Prof., Chemical Engineering
- Vrana, Norman M., M.E.E., Cornell U. Prof., Electrical Engineering
- Walker, Larry P., Ph.D., Michigan State U. Asst. Prof., Agricultural Engineering
- Walter, Michael F., Ph.D., U. of Wisconsin. Assoc. Prof., Agricultural Engineering
- Wang, Kuo-King, Ph.D., U. of Wisconsin. Prof., Mechanical and Aerospace Engineering
- Warhaft, Zelman, Ph.D., U. of London (England). Assoc. Prof., Mechanical and Aerospace Engineering
- Webb, Watt W., Sc.D., Massachusetts Inst. of Technology. Prof., Applied and Engineering Physics
- Wehe, Robert L., M.S., U. of Illinois. Assoc. Prof., Mechanical and Aerospace Engineering
- Weiss, Lionel I., Ph.D., Columbia U. Prof., Operations Research and Industrial Engineering
- Wharton, Charles B., M.S., U. of California at Berkeley. Prof., Electrical Engineering
- White, Richard N., Ph.D., U. of Wisconsin. Prof., Civil and Environmental Engineering
- Wiegandt, Herbert F., Ph.D., Purdue U. Prof., Chemical Engineering
- Wolf, Edward D., Ph.D., Iowa State U. Prof., Electrical Engineering
- Wolga, George J., Ph.D., Massachusetts Inst. of Technology. Prof., Electrical Engineering
- Wood, Sally L., Ph.D., Stanford U. Asst. Prof., Electrical Engineering

## Graduate School

### Administration

Alison P. Casarett, dean  
 John F. Wootton, associate dean  
 Joycelyn Hart, assistant dean  
 Richard Lance, secretary of the graduate faculty

Graduate study at Cornell is pursued through the Graduate School, which administers the many graduate fields of study, and through the various graduate professional schools and colleges.

Programs leading to the degrees of Doctor of Law (J.D.), Doctor of Medicine (M.D.), Doctor of Veterinary Medicine (D.V.M.), Master of Business Administration (M.B.A.), Master of Public Administration (M.P.A.), and Master of Professional Studies in Hospital and Health Services Administration (M.P.S.(H.H.S.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 Graduate School of Business and Public Administration, 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 thesis, and a satisfactory thesis. Certain advanced professional degree programs have specific course or credit requirements; these are announced by the faculty of the professional school or college in which the degrees are offered.

A close working relationship with 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 chairperson of the Special Committee and usually has the primary responsibility for directing the student's thesis 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 nondegree candidates.

### Requirements for Admission

To be admitted to the Graduate School, an applicant should:

- 1) hold a baccalaureate degree granted by a faculty or university of recognized standing or have completed studies equivalent to those required for a baccalaureate degree at Cornell;
- 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) have a combined score of at least 1200 in the verbal and quantitative Aptitude Tests of the Graduate Record Examinations for those fields that require the GREs.

Students from United States colleges and universities should be in the top third of their graduating class.

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 an application form may be obtained from the Educational Testing Service, Princeton, New Jersey 08540, 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 15.

Applicants who are applying simultaneously for Cornell Graduate School Fellowship consideration *must* submit their completed applications and supporting credentials by January 15.

Inquiries regarding admission and fellowships should be addressed to the Graduate School Admissions Office, Cornell University, Sage Graduate Center, Ithaca, New York 14853.

Information concerning admission requirements and courses of study for professional degrees may be obtained from the several schools and colleges that administer them.

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.

Graduate students will find more thorough information in the *Announcement of the Graduate School* and in *Graduate Study at Cornell*. Both publications are available from the Graduate School, Cornell University, Sage Graduate Center, Ithaca, New York 14853.

## School of Hotel Administration

### Administration

John J. Clark, Jr., dean  
 James J. Eyster, assistant dean for academic affairs  
 Normand L. Peckenpaugh, assistant dean for business and administration  
 Peter Rainsford, assistant dean for external affairs  
 Michael H. Redlin, graduate field representative  
 Marianna Desser, director, M.P.S. program  
 Cheryl S. Farrell, director of admissions and financial aid  
 Harry R. Keller, director of alumni affairs  
 Joan S. Livingston, executive editor, *The Cornell Hotel and Restaurant Administration Quarterly*  
 Mary K. Milks, registrar  
 Margaret J. Oaksford, librarian

### Degree Program

Hotel and Restaurant Administration

Degree  
 B.S.

### Facilities

Statler Hall is a unique educational building designed expressly to meet the needs of the faculty and students of the School of Hotel Administration. The building has three parts: a classroom section, a practice inn, and an auditorium with full stage facilities. The five-story classroom section is supplemented by office, classroom, and laboratory space in the Alice Statler Auditorium wing. These two sections comprise lecture rooms, auditoriums, laboratories, and offices for instruction and research in hotel administration.

The Howard B. Meek Library provides an extensive collection of publications on hotel and restaurant operation and related subjects. The library has received many gifts of display materials and personal collections—among them the Herndon and Vehling collections.

Statler Inn, the school's practice laboratory, contains fifty-two guest rooms, including two suites, a fully equipped front office, and lounge areas. The Inn also has a variety of restaurants seating a total of 1,000 people: a formal dining room for 200, five private dining rooms for 8 to 100, two self-service restaurants for 150 and 200, a cocktail lounge, and a ballroom for 400.

The Inn's facilities provide a realistic laboratory for the instruction of students in the operational procedures and managerial responsibilities of the hospitality industry. The school offers its students both theoretical and practical instruction through the use of Statler Inn.

In 1980 the school acquired a former retirement home overlooking Cayuga Lake. This spacious facility will house some of the school's nonacademic functions and serve as a conference center and an international training center for the hospitality industry.

### Curriculum

The School of Hotel Administration offers training in the numerous disciplines required for modern management, including accounting, finance, marketing, operations, and human-resources development. 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, as preparation for assuming positions in the business community. Included in the basic curriculum are courses in financial management, food and beverage operations, administration, and physical-plant management. Students receive firsthand training through the operation of Statler Inn.

To satisfy degree requirements, every undergraduate enrolled in the School of Hotel Administration must complete a minimum of two summer periods of ten weeks each or their equivalent of full-time, supervised employment and file acceptable reports for each work period.

The basic program leading to the degree in hotel administration, as set forth below, can be further enriched with a broad selection of elective courses offered by the school and elsewhere in the University. For instance, the student who wants to specialize in financial management, food and beverage management, or any other area should consult the list of elective courses offered within the school and the index of courses offered by other University divisions.

The school's programs for advanced degrees include those of Master of Professional Studies, Master of Science, and Doctor of Philosophy. For more complete information about undergraduate program requirements, see the *Announcement of the School of Hotel Administration*. For further information on graduate programs, the reader should consult the *Announcement of the Graduate School* or contact Professor Michael H. Redlin, the school's graduate field representative.

### Requirements for Graduation

Regularly enrolled students in the School of Hotel Administration are candidates for the degree of Bachelor of Science. The requirements are:

- 1) Completion of eight terms in residence.\*
- 2) Completion, with a minimum average of 2.0, of 122 required and elective credits, as set forth in the table below.
- 3) Completion of two units of practice credit prior to the last term of residence, as defined below.
- 4) Completion of the University requirement in physical education during the first two terms of residence.
- 5) Attainment of a grade-point average of at least 2.0 in the final semester.

Suggested course programs also appear on the following pages. The required courses account for 84 of the 122 credits needed for graduation. From the hotel electives, some combination of courses totaling at least 14 credits must be taken. The remaining 24 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 will not count toward the degree.

\*Students transferring from other colleges and universities may be allowed appropriate credit against the residence requirement at the time of admission. Transfer students must complete a minimum of five semesters in the program.

Credit earned in military science, aerospace studies, or naval-science courses may be counted in the 24-credit group of free electives.

All students are required by the University to take two courses in physical education, but no credit toward the academic degree is allowed for these courses.

### 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 weight for each term average as follows: A equivalent to 4.0; B to 3.0; C to 2.0; D to 1.0; F to 0.0. For good standing, the student must maintain a minimum average of 2.0. In order to graduate, a cumulative average of 2.0 and a final-term average of 2.0 are required as minimums. Of the free elective courses, a maximum of four credits may be taken on a "satisfactory-unsatisfactory" (S-U) basis.

Students whose term averages are at least 3.3 and are composed of at least 12 credits of letter grades with no unsatisfactory or incomplete grades are honored by being placed on the dean's list.

### Practice Requirement

As part of degree requirements, each undergraduate enrolled in the School of Hotel Administration must complete a minimum of two summer periods of ten weeks each of full-time, supervised employment and file acceptable reports for each work period.\*\* This requirement may also be satisfied by completing one such summer work period and sufficient part-time work to equal ten full-time work weeks. Again, acceptable reports must be filed. Students entering the school who have extensive work experience may satisfy one half of the work-experience requirement if they make application for approval to the Practice Credit Committee at the time of matriculation and submit an acceptable report by the stated deadline. Students are not permitted to register for the final term of residence until they have satisfied the practice requirement in full.

Since cadets in the Army and Air Force Reserve Officer Training Corps are expected to spend six weeks in camp during the summer before their senior year, it is especially desirable that hotel students who plan to join the corps and to take the advanced courses in military science make every effort to expedite their practice work. Similarly, students enrolled in the Naval Reserve Officer Training Corps who must make summer cruises should anticipate the practice requirement as much as possible.

Although the practice requirement is an essential part of the student's program, the school does not guarantee summer positions. Through the school's numerous contacts with the hotel and restaurant industry, a considerable number of openings are available for students. Because jobs suitable for foreign students are considerably less numerous than jobs for students who are American citizens, the foreign student should anticipate some difficulty in finding a position. The school gives what assistance it can to foreign students, but it cannot guarantee placement or assume responsibility for it.

Many of the major hotel and restaurant organizations provide special opportunities for Cornell students to gain wide-ranging experience through unique apprenticeship arrangements.

A limited number of upperclass students are encouraged to enroll in management-intern programs that entail six to eight months of on-the-job managerial instruction and experience. For the details of these programs, see *Directed Study*, on the following pages.

\*\*As set forth in the *Practice Instruction Handbook*, supplied on request from the School of Hotel Administration.

**Course Requirements for Graduation**

<i>Specifically required courses</i>	<i>Credits</i>
Administrative and general management: Hotel Administration 101	0
Human-resources management: Hotel Administration 111, 211	6
Accounting and financial management: Hotel Administration 121, 122, 125, 221, 222	15
Food and beverage management: Hotel Administration 131, 132, 231, 233, 331	12
Law: Hotel Administration 341, 344	6
Properties management: Hotel Administration 251, 351, 352, 451	12
Communication: Hotel Administration 165, 265	6
Science and technology: Hotel Administration 171, 172, 173, 174	12
Economics, marketing, and tourism: Hotel Administration 281, 282, 384	9
Humanities and social sciences electives	6
<i>Specifically required credits</i>	84
<i>Hotel electives</i>	14
<i>Free electives</i>	24
<b>Total credits required for graduation</b>	<b>122</b>

**Undergraduate Program of Study**

This typical arrangement of courses, year by year, is offered for illustration.

The curriculum of the School of Hotel Administration is continually being revised and expanded. In some cases, the numbers of old and new courses overlap. Students are reminded that the most accurate information regarding courses offered during any given semester may be found in the supplement issued for that semester by the school's registrar.

**Freshman Year**

Typically, a freshman schedule will consist of 14 to 17 credits each semester, selected from the following courses.

<i>Specifically required courses</i>	<i>Credits</i>
H Adm 165, Basic Business Writing	3
H Adm 111, Introductory Psychology	3
H Adm 101, Orientation	0
H Adm 174, Information Systems	3
H Adm 121, Financial Accounting	3
H Adm 122, Hospitality Accounting Systems	3
H Adm 125, Finance	3
H Adm 131, Introduction to Food and Beverage Operation and Management	2
H Adm 132, Techniques of Food Production	1
H Adm 171-172, Food Chemistry I and II	7
H Adm 173, Sanitation in the Food-Service Operation	2
	30
<i>Suggested electives*</i>	<i>Credits</i>
H Adm 102, Lectures in Hotel Management	1
H Adm 161, Typewriting	2

**Sophomore Year**

<i>Specifically required courses</i>	<i>Credits</i>
H Adm 211, Management of Human Resources	3
H Adm 221, Managerial Accounting	3
H Adm 222, Managerial Accounting in the Hospitality Industry	3
H Adm 231, Meat Science and Management	3
H Adm 233, Food Production Systems: Cafeterias	3
H Adm 281, Macroeconomics	3
H Adm 282, Microeconomics	3
H Adm 251, Property-Management Graphics	3

\*Fourteen credits of hotel electives are to be taken during the four-year undergraduate program.

H Adm 265, Effective Communication	3
H Adm 331, Food Production Systems: Restaurants	3
	30
<i>Suggested electives</i>	<i>Credits</i>
H Adm 274, Hotel Computing Applications	3
H Adm 223, Front-Office Machine Accounting	1
H Adm 234, Food and Beverage Control	2
H Adm 261, Report Typing	2

**Junior Year**

<i>Specifically required courses</i>	<i>Credits</i>
H Adm 341, Law of Business I	3
H Adm 344, Law of Innkeeping	3
H Adm 351-352, Hotel Mechanical and Electrical Problems I and II	6
H Adm 384, Principles of Marketing	3
	15
<i>Suggested electives</i>	<i>Credits</i>

H Adm 205, Resort and Condominium Management	3
H Adm 305, Rooms-Division Management—Housekeeping and Laundry Operations	2
H Adm 304, Rooms-Division Management—Front Office and Reservations	2
H Adm 314, Psychology in Business and Industry	3
H Adm 381, Advertising and Public Relations	2
H Adm 483, Psychology of Advertising	3
H Adm 322, Investment Management	2
H Adm 323, Financial Analysis and Planning	3
H Adm 326, Introduction to Statistical Analysis and Inference	3
H Adm 204, Franchising in the Hospitality Industry	2
H Adm 284, Tourism	3
H Adm 342, Law of Business II	3
H Adm 306, General Survey of Real Estate	2
H Adm 301, Development of a Hospitality Property	3
H Adm 353, Introductory Food-Facilities Engineering	3
Business and Public Administration NBA 505, Auditing	3

**Senior Year**

<i>Specifically required courses</i>	<i>Credits</i>
H Adm 451, Physical-Plant Planning and Construction	3
<i>Suggested electives</i>	<i>Credits</i>
H Adm 382, Cases in Hospitality Marketing	2
H Adm 311, Union-Management Relations in Private Industry	3
H Adm 401, Seminar in Management Principles	2
H Adm 285, Hotel Sales	2
H Adm 406, Integrated Case Studies in the Hospitality Industry	3
H Adm 601-602, Management Intern Program	†
H Adm 421, Internal Controls in Hotels	2
H Adm 610, Undergraduate Independent Research in Human-Resources Management	†
H Adm 620, Undergraduate Independent Research in Financial Management	†
H Adm 333, Corporate Restaurant Management	3
H Adm 338, Purchasing	2
H Adm 630, Undergraduate Independent Research in Food and Beverage Management	†
H Adm 640, Undergraduate Independent Research in Law	†

†With the exception of the Management Intern Program, only the first three credits of independent study in any area may be counted toward hotel electives. The rest will be credited against free electives.

H Adm 354, Food-Facilities Equipment Design and Layout	3
H Adm 453, Seminar in Environmental Control	3
H Adm 454, Seminar in Hotel Planning	3
H Adm 455, Seminar in Restaurant Planning	3
H Adm 650, Undergraduate Independent Research in Properties Management	†
H Adm 364, Advanced Business Writing	2
H Adm 660, Undergraduate Independent Research in Communication	†
H Adm 670, Undergraduate Independent Research in Science and Technology	†
H Adm 680, Undergraduate Independent Research in Economics, Marketing, and Tourism	†

**Programs in Special Areas**

While completing the required courses leading to the bachelor's degree, undergraduates in the school have the option of concentrating their studies in a major area of instruction. These include administration, financial management, food and beverage management, hotel and motel planning and design, management, marketing, and food science, among others.

When the student selects one of these major fields of concentration, he or she should consult the coordinator of instruction in that area during the sophomore year to plan the sequence of elective courses that will best fit his or her program.

A list of elective courses offered in the school's special areas of instruction is provided below.

**Undergraduate Elective Courses in Hotel Administration**

<i>Administrative and General Management</i>	<i>Credits</i>
H Adm 102, Lectures in Hotel Management	1
H Adm 200, Personal Real-Estate Investments	2
H Adm 203, Club Management	2
H Adm 204, Franchising in the Hospitality Industry	2
H Adm 205, Resort and Condominium Management	3
H Adm 206, General Insurance	3
H Adm 301, Development of a Hospitality Property	3
H Adm 302, Principles of Management	3
H Adm 304, Rooms-Division Management—Front Office and Reservations	2
H Adm 305, Rooms-Division Management—Housekeeping and Laundry Operations	2
H Adm 306, General Survey of Real Estate	2
H Adm 307, Hotel Security and Crime Prevention	2
H Adm 309, Quality Assurance for the Hospitality Industry	2
H Adm 401, Seminar in Management Principles	2
H Adm 402, Hotel Management Seminar	1
H Adm 404, Management Organization of the Small Business	3
H Adm 406, Integrated Case Studies in the Hospitality Industry	3
H Adm 407, Seminar in Hotel Operations	2
H Adm 408, Casino Management	2
H Adm 409, T.A. Training in Administrative and General Management	1-3
H Adm 600, Undergraduate Independent Research in Administrative and General Management	1-3
H Adm 601, Management Intern Program I	6
H Adm 602, Management Intern Program II	6
<i>Human-Resources Management</i>	<i>Credits</i>
H Adm 311, Union-Management Relations in Private Industry: A Survey	3
H Adm 313, Training Human Resources in the Hospitality Industry	3
H Adm 314, Psychology in Business and Industry	3
H Adm 411, Hotel Manpower Management Simulation	3

H Adm 414, Organizational Behavior and Small-Group Processes	3
H Adm 416, Special Studies in the Management of Human Resources	3
H Adm 419, T.A. Training in Human-Resources Management	1-3
H Adm 610, Undergraduate Independent Research in Human-Resources Management	1-3
<b>Accounting and Financial Management</b>	<b>Credits</b>
H Adm 223, Front-Office Machine Accounting	1
H Adm 321, Hotel Management Contracts	1
H Adm 322, Investment Management	2
H Adm 323, Financial Analysis and Planning	3
H Adm 324, Financial Charts and Graphs	1
H Adm 326, Introduction to Statistical Analysis and Inference	3
H Adm 328, Cost Accounting	3
H Adm 421, Internal Control in Hotels	2
H Adm 422, Personal and Corporate Taxation	2
H Adm 429, T.A. Training in Accounting and Financial Management	1-3
H Adm 620, Undergraduate Independent Research in Accounting and Financial Management	1-3
<b>Food and Beverage Management</b>	<b>Credits</b>
H Adm 234, Food and Beverage Control	2
H Adm 333, Corporate Restaurant Management	3
H Adm 337, Survey of Beverages	2
H Adm 338, Purchasing	2
H Adm 434, Production and Merchandising of Desserts	3
H Adm 437, Seminar in Cultural Cuisines	3
H Adm 439, T.A. Training in Food and Beverage Management	1-3
H Adm 630, Undergraduate Independent Research in Food and Beverage Management	1-3
<b>Law</b>	<b>Credits</b>
H Adm 247, Law and the Woman Employee	3
H Adm 342, Law of Business II	3
H Adm 343, Law of Securities Regulation	1
H Adm 449, T.A. Training in Law	1-3
H Adm 640, Undergraduate Independent Research in Law	1-3
<b>Properties Management</b>	<b>Credits</b>
H Adm 353, Introductory Food-Facilities Engineering	3
H Adm 354, Food-Facilities Equipment Design and Layout	3
H Adm 452, Seminar in Interior Design	3
H Adm 453, Seminar in Environmental Control	3
H Adm 454, Seminar in Hotel Planning	3
H Adm 455, Seminar in Restaurant Planning	3
H Adm 459, T.A. Training in Properties Management	1-3
H Adm 650, Undergraduate Independent Research in Properties Management	1-3
H Adm 659, Special Topics	1-3
<b>Communication</b>	<b>Credits</b>
H Adm 161, Typewriting	2
H Adm 261, Report Typing	2
H Adm 262, Typewriting and Business Procedures	3
H Adm 263, Shorthand Theory	3
H Adm 268, Written Communication	1
H Adm 364, Advanced Business Writing	2
H Adm 469, T.A. Training in Communication	1-3
H Adm 660, Undergraduate Independent Research in Communication	1-3
<b>Science and Technology</b>	<b>Credits</b>
H Adm 274, Hotel Computing Applications	3
H Adm 371, Principles of Nutrition	3
H Adm 374, Business Computer Systems Design	3
H Adm 479, T.A. Training in Science and Technology	1-3
H Adm 670, Undergraduate Independent Research in Science and Technology	1-3

<b>Economics, Marketing, and Tourism</b>	<b>Credits</b>
H Adm 284, Tourism	3
H Adm 285, Hotel Sales	2
H Adm 381, Advertising and Public Relations	2
H Adm 382, Cases in Hospitality Marketing	2
H Adm 383, Seminar in Selected Topics of Hospitality Marketing	2
H Adm 481, Seminar in Advertising and Public Relations	2
H Adm 483, Psychology of Advertising	3
H Adm 489, T.A. Training in Economics, Marketing, and Tourism	1-3
H Adm 680, Undergraduate Independent Research in Economics, Marketing, and Tourism	1-3

## Foreign Languages

Mastery of a foreign language is particularly desirable for students who are planning careers in the hotel or restaurant industries. Foreign language study at Cornell is characterized by small classes and emphasis on the spoken language. Students supplement their course work with study in a well-equipped language laboratory.

The first 6 credits of a modern foreign language taken at Cornell University may be counted as hotel electives rather than as free electives. Further information on foreign language courses at Cornell and placement in language courses may be found in the College of Arts and Sciences program description under the Modern Languages, Literatures, and Linguistics section and also under the section Advanced Placement for Freshmen.

## Graduate Curriculum

Candidates for the Master of Science or Doctor of Philosophy degrees should refer to the admission and degree requirements set forth in the *Announcement of the Graduate School*. 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.

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 Bachelor of Science 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 is required to complete track II. Track II students must take 15 credits in a major, 5 credits of monograph (related to their major), 15 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 15 credits in a major, 5 credits of monograph (related to their major), and 12 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 (if no required courses are exempted, 54 credits may be necessary to complete the program). Track IV students must take 15 credits in a major, 5 credits of monograph (related to their major), prerequisites, and any required courses not yet completed.

Students entering tracks II and III should meet with the graduate faculty representative soon after their arrival to select a graduate adviser.

Each student also writes an investigative report or monograph, under the guidance of an adviser, to meet requirements for the M.P.S. degree. This report preferably should deal with the student's area of concentration.

## Required Program for M.P.S. Track I Students

<i>Specifically required courses</i>	<i>Credits</i>
H Adm 773, Graduate Sanitation in the Food-Service Operation	2
H Adm 722, Graduate Managerial Accounting in the Hospitality Industry	3
H Adm 744, Law of Innkeeping	3
H Adm 781, Marketing Management	3
H Adm 774, Computers and Hotel Computing Applications	3
H Adm 723, Graduate Corporate Finance	4
H Adm 731, Graduate Food and Beverage Management	3
H Adm 732, Graduate Operational Food-Production Systems	3
H Adm 751, Graduate Study in Project Development and Construction	3
H Adm 752, Graduate Study in Electrical and Mechanical Systems	3
H Adm 771, Graduate Food Chemistry	4
H Adm 800, Monograph I	3
H Adm 801, Monograph II	2
<i>Specifically required credits</i>	<b>39</b>
<i>Elective credits</i>	<b>25</b>

**Total credits required for M.P.S. Track I students**

**64**

## Directed Study

### Independent Research

Students may conduct independent research projects in any academic department of the school under the direction of a faculty member. Credit is arranged on an individual basis. Only the first 3 credits of directed study may be credited against hotel electives during the undergraduate years. Additional directed study is credited against free electives, with the exception of the management-intern program of 12 credits. To enroll in an independent research project, students must obtain written permission from the school before course registration.

### Management-Intern Program

This program is open only to upperclass and graduate students. Students accepted into the program earn 12 credits. Students enrolled in this program have an opportunity to combine managerial instruction with on-the-job management experience. Application for admission should be made one semester in advance. Instruction is provided by the school's faculty and by the organizations participating in the management-intern arrangements. Management-intern programs are currently in operation at several locations, including the Statler Inn on the University campus. Students receive both academic credit and practice credit, and appropriate financial remuneration for the period of the program. The student is charged reduced tuition.

## Course Information

For the most current and detailed information regarding course offerings of the School of Hotel Administration, the student should consult the supplementary course announcement issued each semester by the school's registrar.



## Administrative and General Management Courses

**101 Orientation** Fall or spring. No credit. Open to new hotel students and students sponsored by the Hotel School to the Division of Unclassified students only. S-U grades only. Required.

M 12:20. Assistant deans Eyster and Rainsford. An introduction to the school, Statler Inn, and the various facets of the hospitality industry.

**102 Lectures in Hotel Management** Fall. 1 credit. Limited to School of Hotel Administration students except by written permission. Hotel elective.

F 1:25. Dean J. J. Clark.  
A series of lectures given by individuals prominent in the hotel, restaurant, and allied fields.

**203 Club Management** Fall or spring, 7 weeks only. 2 credits. Hotel elective.

T 1:25–5. Faculty and visiting lecturers.  
The private-membership club and how it differs from other business forms in the hospitality industry. Emphasis is on legal and operational aspects of ownership and governance. All types are discussed, from the small, in-town luncheon club to the large, complex suburban operation. New developments in the field are surveyed. Club managers serve as visiting lecturers.

**204 Franchising in the Hospitality Industry** Spring, weeks 1–7. 2 credits. Hotel elective.

M 1:25–5. D. E. Whitehead.  
Relationships between franchisor and franchisee, advantages and disadvantages of franchising, structure and services offered by franchisors. Case studies of leading motor-inn and restaurant companies currently offering franchises. Guest speakers from the franchising industry.

**205 Resort and Condominium Management** Spring. 3 credits. Hotel elective.

T 1:25, R 2:30–4:25. M. A. Noden.  
The operation of resort hotels and condominiums. Resorts of various types, seasons, and economic levels are considered. Emphasis is on the promotion of business, the provision of facilities, services, and guest entertainment; and the selection, training, and direction of employees. Terminology, rental-pool agreements, and S E C. regulations, together with developer-management-owner contracts and relationships in condominiums, are reviewed.

**206 General Insurance** Fall. 3 credits. Hotel elective.

M W F 12:20. K. McNeill.  
A comprehensive introduction to the insurance field. The emphasis is on fire insurance, casualty insurance, and multiple-peril policies. Topics covered may include the law of contracts as it relates to insurance; the fire insurance policy and fire insurance forms; business-interruption, marine, burglary, crime, and liability insurance; rates and rate making; bonds; negligence and torts; compensation; package policies; adjustment of losses; and types of insurers.

**300 Personal Real-Estate Investments** Fall or spring. 3 credits. Limited to juniors and seniors from outside the School of Hotel Administration. Hotel students who have taken H Adm 306 may take H Adm 300 as a free elective.

T 10:10–12:05; 1 hour TA rec as scheduled.  
D. Sher.  
Lectures and case studies cover the advantages and disadvantages of real-estate investments and how to maximize gain and minimize risk and possible loss. Subjects covered include (1) the economics of real estate, tax shelters, financial leverage; (2) types of personal real-estate investments; (3) risk analysis, cash flow, and return on investment; (4) sources of financing; (5) joint ventures and syndications; and (6) acquisition and development of real estate. Recitation sessions will deal with the methodology and calculations of real estate analyses.

**301 Development of a Hospitality Property** Spring. 3 credits. Hotel elective.

M 12:20–2:15. D. E. Whitehead.  
Seminar groups of two to four students develop a hospitality project. All aspects of development are covered, from the feasibility study, site acquisition, franchising, construction management, operational preopening, marketing, personnel training, furniture and fixture installation, through the opening of the hotel, motor inn, or restaurant.

**302 Principles of Management** Fall or spring 3 credits. Prerequisite: H Adm 211 or equivalent. Hotel elective. Prerequisite for H Adm 401.

W 11:15–1:10 and F 9:05. P. L. Gaurnier.  
A basic course designed to examine management processes, concepts, and principles and to improve personal competence in decision making, problem solving, and communication. Required readings highlight both classical and modern concepts of management.

**304 Rooms-Division Management—Front Office and Reservations** Fall, 7 weeks only. 2 credits. Hotel elective. Estimated cost of field trip to Washington, D.C., \$100.

F 1–4:30. S. Weisz and visiting lecturers.  
An operational view of the front-office and reservation functions. A trip to Washington, D.C., is scheduled for late in the term.

**305 Rooms-Division Management—Housekeeping and Laundry Operations** Fall. 2 credits. Hotel elective. Estimated cost of field trip to Washington, D.C., \$50.

F 10:10–12:05. S. Weisz and visiting lecturers.  
This course will present an operational view of the housekeeping and laundry functions of a hotel.

**306 Hospitality Industry Real Estate** Fall or spring. 3 credits. Prerequisites: H Adm 121, 125, 281, and 282 or equivalent, or written permission of instructor. Hotel elective.

M 2:30–4:25; rec, T 1:25. D. Sher.  
A practical survey of real estate as capital-investment in the hospitality industry and related industries. Monday lectures cover the role and importance of real estate in the retail environment; the relationship of real estate to the marketing strategy of a company and its investment decisions; the marketing and merchandising of real estate; the financing of real estate; and the effects of real-estate financing on a company's overall corporate financial structure and on its future borrowing ability. Tuesday recitations will deal with application of these subject matters through case studies, financial analyses, role playing sessions, and the like.

**307 Hotel Security and Crime Prevention** Summer. 2 credits. Hotel elective.

M–F 9–4. J. E. H. Sherry and school faculty.  
Designed to provide corporate hotel management with a practical orientation for resolving the operational losses related to personal and physical-premises security. Faculty members discuss aspects of legal liability, insurance protection, architectural and interior-design controls, financial controls, and personnel administration.

**309 Quality Assurance for the Hospitality Industry** Fall or spring. 2 credits. Limited to 30 students. Prerequisite: H Adm 211 and 302 or permission of Prof. Gaurnier. Hotel elective.

F 10:10–12:20. Visiting lecturer.  
This course, developed for Cornell by the American Hotel and Motel Association and Collins Hall Associates, centers on the skills required for the assessment of need, development, budgeting, and implementation of a quality assurance program. Topics will include definitions of quality, diffusion of ideas and innovation, the "cost" of quality, quality standards, measurement and reporting, reward and recognition, developing the plan and budget, and implementing the quality assurance plan. Students will need to use their full range of knowledge in all

areas of hospitality, plus skills in interpersonal and group dynamics.

**401 Seminar in Management Principles** Fall or spring. 2 credits. Limited to 20 seniors and graduate students. Prerequisite: H Adm 302. Hotel elective.

T 11:15–1:10. P. L. Gaurnier.  
This course uses the case-study approach to management principles and concepts. Each student prepares a comprehensive analytical report, based on previous work, for class discussion and analysis.

**402 Hotel-Management Seminar** Fall. 1 credit. Limited to 20 seniors and graduate students. Hotel elective.

F 2:30. Dean J. J. Clark.  
Meeting with Hotel Administration 102 speakers. The subject matter varies, depending on the visitor and his or her area of expertise. Students are expected to ask questions and participate in discussions.

**404 Management Organization of the Small Business** Fall. 3 credits. Limited to 30 students. Prerequisite: H Adm 221 or Agricultural Economics 323 or equivalent. Hotel elective. Approximate cost of field trips, \$25.

T 1:25–4:25. F. M. Waters.  
A comprehensive survey of management fundamentals basic to planning, organizing, directing, and controlling the small enterprise. Course work includes a team term project, selected readings, case studies, and field exercises.

**406 Integrated Case Studies in the Hospitality Industry** Fall or spring. 3 credits. Limited to 18 seniors and graduate students. Hotel elective.

T 1:25–4:25. R. M. Chase, P. L. Gaurnier.  
Analysis of case studies involving issues of business strategy, human relations, administration, marketing, and finance. Students apply course principles in a restaurant-management simulation exercise.

**407 Seminar in Hotel Operations** Spring. 2 credits. Limited to 30 seniors and graduate students. Hotel elective. Estimated cost of field trip, \$30.

F 10:10–12:05. P. Kreuziger.  
Intended to provide a working knowledge of the terminology, concepts, and procedures utilized by hotel management in developing information and making decisions relevant to forecasting and controlling manpower requirements consistent with fluctuating business conditions. Major topics include staff planning, budgeting, scheduling and payroll control, forecasting technique and practice, considerations for operating within the guidelines of collective bargaining, financial-statement analysis, and hotel case studies oriented toward productivity analysis. A field trip, usually in the third week, is required.

**408 Casino Management** Fall or spring. 2 credits. Limited to 50 School of Hotel Administration seniors and graduate students. Hotel elective. Estimated cost of field trip, \$100.

M 2:30–4:25. D. Macomber.  
The management responsibility of casino operations. Overview and analysis of casino administration, with emphasis on the relationship between the hotel general manager and the casino manager, their various responsibilities, marketing and junkets, physical layouts, licensing, government regulation, personnel and training, internal controls, and security systems. General instruction in basic casino games, including odds, percentages, and strategy. Includes a weekend field trip to Atlantic City.

**409 T.A. Training in Administrative and General Management** Fall or spring. 1–3 credits.

Prerequisite: written permission of instructor. Hotel elective.  
Hours to be arranged. Faculty.  
The student planning to be a teaching assistant in administrative and general management is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

**701 Graduate Seminar in Hotel Operations** Fall. 2 credits. Limited to 30 graduate students. Hotel elective. Estimated cost of field trip, \$75.

F 10:10–12:05. P. L. Gaumier.  
Intended to provide a working knowledge of the terminology, concepts, and procedures utilized by hotel management in developing information and making decisions relevant to forecasting and controlling manpower requirements consistent with fluctuating business conditions. Major topics include staff planning, budgeting, scheduling and payroll control, forecasting technique and practice, considerations for operating within the guidelines of collective bargaining, financial-statement analysis, and hotel case studies oriented toward financial-statement analysis and toward productivity analysis. A required field trip to the participating hotel is an integral part of the study program. The field trip is usually scheduled for the second week of classes; to prepare adequately for this trip, all students are required to attend the first week of classes. Students who intend to return to school one week late should not preregister for this course.

## Human-Resources Management Courses

**111 Introductory Psychology** Fall or spring. 3 credits. Required.

Lecs, M W F 9:05; 2-hour lab to be arranged. F. Berger.

An introductory study of psychological principles essential for understanding human behavior. Basic concepts integral to effective hotel management are treated, including perception, motivation, learning, and personality.

**211 Management of Human Resources** Fall or spring. 3 credits. Prerequisite for hotel students: H Adm 111. Required.

Lecs, M W 11:15 or 12:20; 1-hour lab to be arranged. D. A. Dermody.  
Problems of personnel management, including an introduction to the personnel function; recruitment, selection, and placement of personnel; the role of supervision with emphasis on induction, training, communications, performance appraisal, and leadership style; wage and salary administration; motivation; and union-management relations. Emphasis is on class discussion and analysis of case problems from business and industry.

**311 Union-Management Relations in Private Industry: A Survey** Fall. 3 credits. Limited to juniors, seniors, graduate students, and those who have received written permission of the instructor. Hotel elective.

T 1:25–3:15, W 1:25. F. A. Herman.  
Major areas of study include the development of the trade-union movement in the United States, with emphasis on the history and structure of unions active in all phases of the hospitality industry; federal and state laws governing the bargaining relationship, including the role of the National Labor Relations Board; the collective-bargaining process, including negotiations and contract administration; and the critical role of conciliation procedures (such as mediation and arbitration) in keeping industrial peace.

**313 Training Human Resources in the Hospitality Industry** Fall. 3 credits. Limited to 40 students. Prerequisites: H Adm 211 or 314, or equivalent. Hotel elective.

T 12:20–2 and R 12:20. Faculty.  
A basic course in the fundamentals of training manpower. Starting with the psychology of learning, the course will move quickly into the applications of training techniques in solving hotel and restaurant manpower-utilization problems. Each student will be required to develop a training program for a job or task. Emphasis will be on improving performance through the management of training.

**314 Psychology in Business and Industry** Fall or spring. 3 credits. Limited to 50 School of Hotel Administration students. Prerequisites: H Adm 111 and 211, or equivalent. Hotel elective. Students who plan to take H Adm 315 should plan to take 314 first.

T 12:20–2:15, R 12:20. Faculty.  
The principles of psychology applied to industrial and business systems; personnel selection; placement and training; problems at work, including evaluation, motivation, efficiency, and fatigue; and the social psychology of the work organization.

**411 Hotel Manpower Management Simulation** Spring. 3 credits. Limited to 20 School of Hotel Administration seniors and graduate students. Hotel elective.

R 2–4:25. Faculty.  
The course, based on the simulation of a profit-making facility and of a nonprofit facility, provides advanced training in the use of simulation as a training device. Groups of four or five students develop a simulation exercise.

**414 Organizational Behavior and Small-Group Processes** Fall. 3 credits. Open to a limited number of hotel seniors and graduate students by written permission of the instructor. Hotel elective.

M 2–4:25. F. Berger.  
Current research will be examined to provide a conceptual framework for understanding group processes within organizations. In addition, students will participate in experiential laboratories aimed at enhancing their effectiveness as members or leaders of groups. Topics that will be studied include stages of group development, leadership, decision making, motivation, power, and organizational change.

**416 Special Studies in the Management of Human Resources** Fall. 3 credits. Limited to seniors and graduate students, except for those who have received written permission of the instructor. Prerequisite: H Adm 211. Hotel elective.

M 7:30–9:30 p.m., T 1:25–2:15. F. Berger.  
A case-study approach to the problems and challenges of managing people in business organizations. Actual cases are presented for discussion by individuals who were involved in the cases.

**419 T.A. Training in Human-Resources Management** Fall or spring. 1–3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. D. A. Dermody.  
The student planning to be a teaching assistant in human-resources management is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

**711 Dispute Resolution in Service Industries** Spring. 3 credits. Limited to graduate students and seniors who have received written permission of instructor. Hotel elective.

W 2:30–5:30. F. A. Herman.  
The nature of conflicts that arise during negotiation of new labor contracts (interest disputes), and those that arise over the meaning and interpretation of labor contracts already in force (grievance disputes). Methods for resolving conflicts in nonunionized properties are also explored. Picketing, recognition, certification and decertification, unfair labor practices, successor rights and obligations, preemption behavior, and the practical applications of grievance handling through the final step of the procedure (usually arbitration) are discussed and illustrated.

**718 Advanced Human-Resource Management** Spring. 3 credits. Limited to 18 graduate students. Prerequisites: H Adm 111 and 211 or equivalent. Hotel elective.

M 10:10–12:50. Two weekend sessions: week 6 and week 12. (The number of M sessions will be adjusted accordingly.) F. Berger.

The focus will be on development of human-resource management skills and exploration of the dilemmas and responsibilities of leadership. Students will gain insight into their patterns of management behavior by integrating conceptual material with management games and simulations, interaction analysis, and constructive feedback.

## Accounting and Financial Management Courses

**120 Basic Principles of Accounting and Financial Management** Fall or spring. 2 credits. Limited to students outside the School of Hotel Administration. May be taken with H Adm 322 to include the investment aspects of financial management.

W 2:30–4:25. F. M. Waters.  
A survey of accounting principles, financial statements, cash forecasting, and cash budgeting, and an introduction to financial analysis. Intended for students who desire a general knowledge of the language of business and finance.

**121 Financial Accounting** Fall or spring. 3 credits. Required. Limited to School of Hotel Administration students.

Lecs, M W 10:10; 1-hour lab to be arranged. D. H. Ferguson.  
An introduction to the basic principles of accounting, involving transactions analysis, flow of accounting data to the financial statements, and careful consideration of accounting for revenues, expenses, assets, liabilities, and owner equity.

**122 Hospitality Accounting Systems** Fall or spring. 3 credits. Prerequisite: Hotel Administration 121 or equivalent. Required.

T R 9:05; lab, T or R 2:30–4:25. D. C. Dunn.  
The accounting systems recommended by the American Hotel and Motel Association, the National Restaurant Association, and the Club Managers' Association of America for hotels, motels, restaurants, and clubs. Topics include hotel and motel front-office accounting; accounting for the restaurant and other sales areas; special journals and ledger accounts peculiar to hospitality-accounting systems; the flow of accounting transactions through the accounting system; and the preparation and interpretation of financial statements.

**125 Finance** Fall or spring. 3 credits. Prerequisite: H Adm 121 or equivalent. Required.

T R 11:15; 1-hour T lab to be arranged. R. M. Chase.  
An objective study of financial management in profit-oriented enterprises. Important concepts include cash flow, the time value of money, and capital budgeting. Emphasis is on the analysis of accounting information, problem solving, and decision making.

**220 Financial Accounting Principles** Fall or spring. 3 credits. Limited to students outside the School of Hotel Administration.

T R 11:15–1:10. D. C. Dunn.  
The basic principles of accounting, including transactions analysis and flow of accounting data to the financial statements. Emphasis is on accounting for revenues, expenses, assets, liabilities, and owner's equity.

**221 Managerial Accounting** Fall or spring. 3 credits. Prerequisites: H Adm 121 and 125, or equivalent. Required.

Lecs, T R 10:10; 2-hour lab to be arranged. Two evening exams to be arranged. Faculty.  
The use of accounting information for managerial planning, control, and evaluation. Particular emphasis is on differential accounting and its role in extracting relevant decision variables. Other topics are accounting systems, behavior of costs, budget preparation, standard costs, the analysis of variance from standard costs, and performance reports.

**222 Managerial Accounting in the Hospitality Industry** Fall or spring. 3 credits. Limited to 160 students. Prerequisite: H Adm 122 or 221 or equivalent. Required.

Lecs, T R 10:10; 1-hour lab to be arranged.  
C. Henry.

Methods of operational analysis for hospitality properties are evaluated and used in ratio, comparative, and cost-volume-profit analyses. Other topics include internal control, operational budgeting, and the use of feasibility studies in long-term capital-budgeting decisions. Stress is on presenting analysis results in management letters.

**223 Front-Office Machine Accounting** Fall or spring. 1 credit. Prerequisite: H Adm 121 or equivalent. Hotel elective.

Two-hour practice lab to be arranged. D. C. Dunn. Students learn the operation of the NCR front-office posting machine by completing a series of practical exercises ranging from simple posting of charges and credits to error correction and the night audit.

**321 Hotel Management Contracts** Fall, 7 weeks only. 1 credit. Limited to 60 juniors, seniors, and second-year graduate students. Hotel elective.

W 2:30–4:25. J. J. Eyster and guest lecturers. A critical analysis of the negotiation and administration of hotel management contracts. Topics include advantages, disadvantages, and risks of contracts to both owners and operators; owner and operator concerns during negotiations and their resolution; owner and operator concerns during administration of the contract; and the future role of contract use. Guest lecturers include owners and operators.

**322 Investment Management** Fall or spring. 2 credits. Limited to juniors, seniors, and graduate students. Hotel elective.

R 10:10–12:05. Faculty. The course covers institutional and analytical aspects of security analysis and investment management, securities markets, sources of investment information, bonds and stocks valuation models, risk-return analysis, behavior of security prices, portfolio analysis, and portfolio management. The course also covers capital-asset pricing theory, and the practical aspects of security analysis and investment management. Computer-assisted analysis is discussed and applied in a realistic manner using interactive computer programs. Background in economics, accounting, and finance recommended.

**323 Financial Analysis and Planning** Fall. 3 credits. Prerequisite: H Adm 222. Hotel elective.

M W 9:05–11. F. M. Henry. After defining and describing the environment in which a business organization must design its strategy, an examination will be made of financial-analysis and planning techniques necessary to operate in that environment. Focus is on discussion and case studies involving the following areas of financial management: the tax environment, profit planning and forecasting, budgeting, capital-budgeting techniques, and cost-of-capital determination.

**324 Financial Charts and Graphs** Spring, weeks 2–8. 1 credit. Limited to 20 students. Prerequisite: H Adm 251 and 221. Hotel elective.

W 2:30–4:25. R. H. Penner. An introduction to and concentrated study of financial charting—the visual presentation of quantitative data. Includes a review of the several types of charts and graphs and their use to show relative or proportionate amount, trend, et cetera. Students analyze and evaluate charts from annual reports and the media, and design charts to communicate data effectively.

**328 Cost Accounting** Spring. 3 credits. Prerequisite: H Adm 221 or equivalent. Hotel elective.

T 10:10, R 10:10–12:05. D. H. Ferguson. Emphasis is on the use of cost-accounting information for managerial planning, control, analysis,

and evaluation. The coverage will include the principles of cost accounting, cost-accounting systems, budgeting, and analysis and control, as well as the special topics of joint products and by-products, transfer pricing, responsibility accounting, and performance measurement. The course explores advanced managerial accounting concepts and their application to the hospitality industry. Case studies will be used.

**421 Internal Control in Hotels** Spring. 2 credits. Limited to seniors and other students who have received permission of instructor. Prerequisite: H Adm 122, 722, or equivalent. Hotel elective.

T R 9:05 or T R 10:10. A. N. Geller. Discussion of problems encountered in distributing the accounting and clerical work in hotels to ensure a good system of internal control. Study of many actual cases of the failure of internal control and the analysis of the causes of the failure. Practical problems and actual techniques of functioning systems of internal control are examined.

**422 Taxation and Management Decisions** Fall. 2 credits. Limited to 50 juniors, seniors, and graduate students. Hotel elective.

W 2:30–4:25; 1-hour rec to be arranged.  
A. J. 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; use of depreciation methods to achieve tax reductions; syndication techniques; and the role tax laws play in promoting private investment and development.

**429 T.A. Training in Accounting and Financial Management** Fall or spring. 1–3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty. The student who plans to be a teaching assistant in accounting and financial management is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

**722 Graduate Managerial Accounting in the Hospitality Industry** Spring. 3 credits. Required M.P.S. course.

T R 2:30–4:25. D. H. Ferguson. 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 in long-term capital-budgeting decisions. Stress is on communicating analysis results using management letters.

**723 Graduate Corporate Finance** Fall. 4 credits. Prerequisite: H Adm 722. Recommended: knowledge of algebraic techniques and elementary statistics (students who have not recently had a statistics course are urged to purchase and study

programmed review books in mathematics and elementary statistics). A list of recommended books (available at the Campus Store) will be distributed at registration. Required M.P.S. course.

Lecs, T R 2:30–4:25; 2-hour sec to be arranged. Faculty.

An introduction to the principles and practices of business finance, including the development of theory and its application in case studies. Specific topics include types of securities and their uses, valuation concepts, capital budgeting, cost of capital, capital structure, dividend policy, long-term financing and bank relations, short- and intermediate-term financial management, mergers and consolidations, and the legal aspects of financial management.

**724 Interpretation and Analysis of Financial Statements** Spring. 3 credits. Limited to 20 second-year graduate students. Prerequisite: all required hotel accounting courses. Hotel elective.

T R 2:30–4:25. A. N. Geller. The various financial accounting issues encountered in reporting the results of operations of corporate enterprises are discussed. A macro view of the firm will be taken, with emphasis on both outsiders' views of the operation and decision making through interpretation of the published statements. Current, generally accepted accounting principles and future extensions are explored and 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.

## Food and Beverage Management Courses

**131 Introduction to Food and Beverage Operation and Management** Fall or spring. 2 credits. Required.

W 11:15–1:10. J. B. Knight. An introductory course designed to familiarize students with the language and systems of commercial food and beverage operations. The language of food production, equipment, utilities, preparation, cooking, beverages, and service will compose the major portion of the course.

**132 Food-Production Techniques** Fall or spring. 1 credit. Prerequisite: H Adm 131. Required.

3-hour sec to be arranged. T. A. O'Connor. A laboratory-based course designed to familiarize students with techniques of food preparation. Practical application of information gained in Hotel Administration 131. Each student must supply a cook's knife and paring knife.

**231 Meat Science and Management** Fall or spring. 3 credits. Required.

Lec, M 2:30–4:25; 2-hour lab to be arranged.  
G. X. Norkus, B. A. Schmidt. Deals with the major phases of meat, poultry, and fish service from the hotel, restaurant, club, and institutional standpoints; nutritive value, structure, and composition; sanitation; selection and purchasing; cutting, freezing, portion control, and specifications; cooking, carving, and miscellaneous topics. A three-day field trip to visit purveyors in New York is required.

**233 Food-Production Systems: Cafeterias** Fall or spring. 3 credits. Prerequisites: H Adm 131, 132, 171, 172, 173, 231 (possible corequisite). Required.

Lec, M 1:25; 6-hour afternoon lab. A. L. Colucci. A cafeteria food-production course in which the student participates as a team member in hot-food, cold-food, dessert, and bakery production. Lectures cover principles of cafeteria menu planning, truth-in-menu, recipe standardization, support areas, sanitation, calculating raw food costs, menu-pricing systems, convenience foods, and types of production systems. Students are required to purchase their own french, boning, and paring knives; measuring spoons; and food thermometer. Students work six to seven weeks in each of two different cafeterias.

**234 Food and Beverage Control** Fall or spring. 2 credits. Prerequisite: H Adm 122 or written permission of instructor. Hotel elective.

T R 9:05–11. D. W. D'Aprix. Food and beverage operation from the position of the food and beverage controller and analyst are studied. Control systems and analytical techniques are discussed and applied to operational situations.

**331 Food-Production Systems: Restaurants** Fall or spring. 3 credits. Prerequisites: H Adm 231 and 233. Required. Estimated expense of clothing and utensils, \$95.

Lec. M 1:25; 8-hour lab M, T, W, or R. T. J. Kelly, R. White.

This course is designed to provide the student with the skills necessary to perform the management functions of a restaurant.

**337 Survey of Beverages** Spring. 2 credits. Limited to seniors and second-year students in the School of Hotel Administration. Hotel elective.

W 2:30–4:25; 4 night sessions to be arranged. V. A. Christian.

An introduction to wines, beers, spirits, and other beverages as they relate to the hospitality industry. Samples from a variety of countries, regions, and vineyards are evaluated.

**338 Purchasing** Spring. 2 credits. Limited to 65 juniors, seniors, and graduate students in the School of Hotel Administration. Hotel elective.

W 2:30–4:25. G. X. Norkus.

An in-depth look into the functions of a purchasing department within a hotel or restaurant facility. The managerial aspects of purchasing, such as setting up a purchasing department, the function of the purchasing agent, purchasing specifications, purchasing forms, and controls are considered. Includes many of the products purchased by a food facility, such as china, flatware, glasses, fabric, meat, frozen foods, canned goods, produce, dairy products. The products are displayed by leading purveyors and discussed in detail.

**430 Introduction to Wine and Spirits** Fall or spring. 2 credits. Limited to seniors and graduate students outside the School of Hotel Administration. S-U grades only.

W 2:30–4:25. M. Nowlis.

The course begins with the history of wine and spirits. The main focus is on flavor characteristics, fermentation processes, and brand specifications. Lectures are also given on purchasing, storage, wine-tasting techniques, and drink formulas. 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 secretary in 212 Statler Hall of their absence are automatically dropped from the course.

**433 Food-Service Management in Business-, Industry-, and Health-related Facilities** Fall or spring. 3 credits. Prerequisites: (hotel students) H Adm 331; (out-of-school students) equivalent of H Adm 331. Recommended (all students): a nutrition course. Hotel elective. Estimated cost of required field trip, \$150.

M W F 9:05. A. L. Colucci.

Designed to explore and analyze the internal workings of food-service management in business-, industry-, and health-related facilities, the course builds on information gained from required courses. It presents characteristics of, and analyzes, food-service organization structures, job descriptions, internal controls, internal-systems design, specialty food-service equipment considerations, and regulations. These factors are analyzed in the context of areas such as office and industrial complexes, airline catering, concession management, educational institutions, and contract and hospital food-service management. A field trip to a metropolitan area, where each type of food-service management is in operation, is an integral part of the course. Conferences with appropriate directors and managers, as well as on-campus guest speakers, are included in the course.

**434 Production and Merchandising of Desserts** Fall or spring. 3 credits. Prerequisites: H Adm 233, 331, or 732. Hotel elective.

Lec. W 12:20; lab, W 1:30–5:30. D. W. D'Aprix. How to make and profitably merchandise such desserts as pies, sweet-dough pastries, danish and puff pastries, pâté choux, cookies, cakes, ice desserts, and other specialty desserts.

**437 Seminar in International Cuisines** Spring. 3 credits. Prerequisites: H Adm 331 or 732 and permission of instructor. Hotel elective.

Sem. R 9:05–11; lab, M 11:15–4:30.

T. A. O'Connor.

A seminar in cuisines of the world. Through research and hands-on practice, students will explore various cuisines in depth. The goal of the course is to develop an awareness of the evolution of several international cuisines through cultural developments, enabling students to create diverse menus.

**439 T.A. Training in Food and Beverage Management** Fall or spring. 1–3 credits.

Prerequisite: written permission of the instructor. Hotel elective.

Hours to be arranged. Faculty.

The student who plans to be a teaching assistant in food and beverage management is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

**731 Graduate Food and Beverage Management** Fall or spring. 3 credits. Required M.P.S. course.

Estimated cost of field trip, \$100.

Lecs. T 11:15–12:05; R 11:15–1:10; four 7:30–9:30 p.m. sessions to be arranged. S. A. Mutkoski. The managerial and operational principles and techniques of planning, operating, and evaluating a food and beverage operation. Special emphasis is placed on menu planning, wine-list design, professional standards, and the managerial approach to purchasing, receiving, storage, issuing, preparation, and service. A field trip is required.

**732 Graduate Operational Food-Production Systems** Fall or spring. Limited to 24 students.

Prerequisite: H Adm 731 or equivalent. Required M.P.S. course. Estimated expense for clothing and utensils, \$95.

Lec. T 5:30–8:30 p.m.; 8-hour F lab. J. B. Knight. Students are responsible for production and service of dinner for the Statler Inn Main Dining Room and Cafe Rhea. The course is designed to teach and apply the fundamentals of food-production systems, from menu planning through service, and to give the student confidence in managing a commercial kitchen or dining room. The lecture-demonstration provides further exposure to managerial as well as technical skills.

**735 Graduate Meat Science and Management**

Fall. 3 credits. Limited to graduate students. M.P.S. elective.

M 5:30–8:30 p.m. S. A. Mutkoski.

Purchasing, receiving, storage, utilization, and cost analysis of meat, fish, poultry, and meat extenders and analogs are discussed from the standpoint of commercial food service in a seminar-laboratory combination. Independent research on current problems in meat science and management is required.

## Law Courses

**247 Law and the Woman Employee** Spring. 3 credits. Hotel elective.

M W F 12:20. J. E. H. Sherry.

Designed to enable management to deal with the legal problems of female employees as these problems affect the hospitality industry and to provide information regarding the emerging legal rights of women generally.

**341 Law of Business I** Fall. 3 credits. Limited to juniors and seniors. Required.

M W F 12:20. J. E. H. Sherry.

A basic introduction to law and legal relationships in business. A variety of subjects are covered, all intended to aid managers in decision making.

**342 Law of Business II** Spring. 3 credits.

Prerequisite: H Adm 341. Hotel elective.

M W F 10:10. J. E. H. Sherry.

A continuation of Hotel Administration 341 for those students who desire more extensive legal training to further their business careers. Emphasis is on the laws pertaining to the Uniform Commercial Code (sales and negotiable instruments); bailments; trusts and estates; transfers by will; unfair competition and trade regulation; bankruptcy; and insurance.

**343 Law of Securities Regulation** Fall, 7 weeks only. 1 credit. Open to juniors, seniors, and graduate students. Best taken after an introductory course in business law. Hotel elective.

M 2:30–4:30. P. Panarites.

For students interested in the financing of new or expanding hotel and restaurant businesses through the sale of stocks and bonds, and the obligations of publicly owned hospitality companies and their officers and directors. The course covers fundamental aspects of the federal securities laws as applicable to the hospitality industry. Problems will be drawn from hotel, restaurant, and related businesses.

**344 Law of Innkeeping** Fall or spring. 3 credits.

Limited to juniors and seniors. Prerequisite or corequisite: H Adm 341 or equivalent. Required.

M W F 9:05. J. E. H. Sherry.

A basic grounding in the fundamentals of hotel and restaurant management as they affect legal rights and responsibilities. Emphasis is on recognition of issues and organization of solutions in a logical, well-conceived manner.

**449 T.A. Training in Law** Fall or spring. 1–3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student who plans to be a teaching assistant in law is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

**744 Law of Innkeeping for Graduate Students**

Fall or spring. 3 credits. Required M.P.S. course.

M W F 8. J. E. H. Sherry.

A review of fundamentals followed by an in-depth consideration of the legal aspects of the hospitality industry.

## Properties Management Courses

**251 Hospitality-Facilities Planning** Fall or spring. 3 credits. Required.

Lecs. M W 9:05; 2-hour lab to be arranged.

D. Oswald.

An introduction to both properties management and hospitality facilities. Components of the course include projection and architectural drawing, site analysis and planning, and hotel functional design. Laboratory emphasis is on basic graphic skills, including the layout of lodging and dining spaces, and the interpretation of construction drawings.

**351 Hotel Mechanical and Electrical Problems I**

Fall. 3 credits. Prerequisite: H Adm 251. Required.

Lecs. M W F 11:15; 2-hour lab to be arranged.

D. M. Stipanuk.

Investigation of management problems associated with the mechanical systems of the physical plant. Utility management and energy conservation are emphasized. Water, electricity, and lighting systems as well as sound and acoustics are covered. Basic engineering theory of each system is taught. Capital, operating, and repair and maintenance costs are stressed.

**352 Hotel Mechanical and Electrical Problems II** Spring. 3 credits. Prerequisite: H Adm 351. Required. Lects, M W F 11:15; 2-hour lab to be arranged. M. H. Redlin.

Investigation of management problems associated with the mechanical systems of the physical plant, with emphasis on major systems of heating, refrigeration, and air conditioning. The problems of capital expenditures, operating costs, and repairs and maintenance are stressed.

**353 Introductory Food-Facilities Engineering** Fall. 3 credits. Limited to 12 students. Prerequisites: H Adm 251 or equivalent, and written permission of instructor before course registration. Hotel elective. Lects, M W 1:25; 2-hour lab to be arranged. M. H. Redlin.

The basic concepts of food-facilities design and planning. Studies are carried out to determine space allocation for kitchens, refrigeration, storage, waste disposal, and service area. Development of basic production work flow in the preparation and service areas is emphasized. The basic requirements for the selection of equipment, utilizing industry standards for production capability, quality of construction, and ease of maintenance, are covered. Laboratories involve planning, design, and specification writing for a small- to medium-size restaurant kitchen.

**354 Food-Facilities Equipment Design and Layout** Spring. 3 credits. Prerequisite: H Adm 353 or equivalent. Lects, M W 1:25; 2-hour lab to be arranged. M. H. Redlin.

A course designed to employ the basic concepts of food-facilities design in advanced applications. Emphasizes preparing a program, developing and criticizing equipment layouts, mechanical and electrical spotting, and equipment-detail drawings.

**451 Physical-Plant Planning and Construction** Fall or spring. 3 credits. Prerequisite: H Adm 352. Required. Lects, M W F 12:20; 2-hour lab to be arranged. R. A. Compton.

The construction, renovation, and maintenance of hotels and food-service operations are discussed and analyzed. Procedures, methods, and materials used in new construction projects are covered, as are repair, rehabilitation, and renovation of existing structures. Building codes, trade practices, materials, cost estimation, and management responsibilities are emphasized.

**452 Seminar in Interior Design** Spring. 3 credits. Limited to 12 students. Juniors, seniors, and graduate students only. Hotel elective. Minimum cost of required field trips, \$150. T R 11:15–1:10. R. H. Penner.

A project course concerned with hotel and restaurant planning, interior design, and renovation. Students will establish the operator's criteria for the design of hotel guest rooms and public areas, prepare budgets and schedules, and develop preliminary conceptual designs.

**453 Energy-Management Techniques** Spring. 3 credits. Limited to 16 students. Prerequisite: H Adm 352 or 752. Hotel elective. T R 2:30–3:45. D. M. Stipanuk.

A seminar intended to acquaint students with the procedures needed to (1) plan and conduct detailed energy audits of hotels, (2) establish and operate effective energy-management programs, and (3) identify and evaluate effective systems of energy-retrofit measures for hotels. Actual case studies will be developed by the students.

**[454 Seminar in Hotel Planning]** Fall. 3 credits. Limited to 12 students. Prerequisites: H Adm 352, 752, or written permission of instructor prior to registration. Hotel elective. A field trip may be required; estimated cost, \$200. Not offered 1983–84. T R 11:15–1:10. R. H. Penner.

The hotel planning process, emphasizing program development, site selection, conceptual design, and building systems. Discussion of space allocation, hotel equipment and furnishings, establishing budgets, and responsibilities of the development team. One or two team projects are developed.]

**455 Seminar in Restaurant Planning** Fall or spring. 3 credits. Limited to 12 students. Prerequisites: H Adm 351 and permission of instructor. Hotel elective. Estimated cost of optional field trip, \$150. M W F 9:05. R. A. Compton.

The procedures followed in the planning of a restaurant facility. Primary emphasis is on design, engineering, and construction. Discussions of space allocation, trade practices, building and health codes, equipment and furnishings, cost estimations, and management responsibilities when working with professional planners. Case studies are used, and a project is developed.

**459 T.A. Training in Properties Management** Fall or spring. 1–3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty. The student who plans to be a teaching assistant in properties management is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

**751 Graduate Study in Project Development and Construction** Fall. 3 credits. Required M.P.S. course. Lec, T R 8:40–9:55; 2-hour lab to be arranged. R. H. Penner.

The major elements of project development and the construction process are presented and developed from an engineering-management viewpoint. Topics include feasibility studies, functional planning and design, financing techniques, the bidding process, construction contracts, project scheduling, and actual building construction. Techniques for effective graphic communication are developed and integrated into the design process.

**752 Graduate Study in Electrical and Mechanical Systems** Spring. 3 credits. Required M.P.S. course. Lects, T R 8:30–9:45; 2-hour lab to be arranged. D. M. Stipanuk.

The major electromechanical systems of large buildings and lodging properties are considered from a capital-cost versus operating-cost viewpoint. Includes consideration of water, heating, refrigeration, air conditioning, electrical, and lighting systems. Concepts of energy conservation and efficient utilities management, from the original selection of equipment through operating procedures, are emphasized. Students analyze case studies, criticize papers and reports, and suggest new systems and modifications.

## Communication Courses

**161 Typewriting** Fall or spring. 2 credits. Limited to 34 students. Hotel elective. M W F 10:10, 11:15, or 12:20, or T R F 9:05. B. B. David.

A beginning course in electric key-boarding designed for those students who wish to learn touch typing. Recommended for students who plan to take a computer course. Students will be introduced to correct typing techniques for centering, tabulation, manuscripts, and letter styles.

**165 Introduction to Writing for Business** Fall or spring. 3 credits. Each section limited to 20 students. Required.

M W F 9:05, 10:10, or 11:15; or M W 1:25 and F 9:05; or M W 2:30 and F 11:15. D. A. Jameson, D. G. Flash, J. F. Lumley, C. Solomon.

Written reports provide the information that people in organizations need to form judgments and make decisions. To succeed in its purpose of informing, analyzing, or recommending, a report needs logical organization, appropriately developed material, and effective use of language. This course focuses on the knowledge and skills necessary to write successful business reports.

**166 Continuing French: Le Français de l'Hôtellerie (also French 123S)** Fall or spring. 4 credits. Limited to 12 students in each recitation section. Prerequisites: French 122 or equivalent and written permission of instructor. Hotel elective.

Lecs, T 10:10; drills, M W R F 10:10 or 11:15.

N. Gaenslen, A. Levy. This course offers continuing study of the French language, in the context of business affairs, with specific emphasis on the hospitality industry. Presentation of material will consider cultural, geographic, economic, historical, political, and social contexts within which the business functions. The course will be conducted in French, emphasizing a conversational approach. Specialized situations and vocabulary will be used in building general competence in practical usage. Students with good spoken skills and a special interest in the hospitality industry will be given priority for admission to the course.

**261 Report Typing** Fall or spring. 2 credits. Limited to 34 students. Prerequisite: H Adm 161 or equivalent. Hotel elective. T R 10:10. B. B. David.

A course in electric touch-typing designed for students who can type but want to improve their speed and accuracy. Special emphasis is placed on the typewritten report as a form of communication. Business letters are typed in various styles, and their effectiveness is studied.

**262 Typewriting and Business Procedures** Fall or spring. 3 credits. Limited to 24 students. Prerequisite: H Adm 161 or equivalent. Hotel elective. M W F 12:20. B. B. David.

Students who already know touch-typing develop sufficient speed and accuracy on electric typewriters to meet business standards for an executive assistant. The course involves practice in the typing and composing of business letters and special forms of business communication, including tabulated reports. Instruction in filing, duplicating processes, and machine transcription is provided.

**263 Shorthand Theory** Fall or spring. 3 credits. Limited to 20 students. Prerequisite: a typing course. Hotel elective. M W R 1:25. B. B. David.

The basic theory of Gregg shorthand is covered. Shorthand is a personal tool used by business and professional men and women when taking notes, composing letters, and drafting speeches and reports. Dictation and transcription speed is developed to meet the needs of a stenographic position.

**265 Effective Oral Communication** Fall or spring. 3 credits. Limited to 25 students a section. Required. Lects, M 9:05–11 and W 9:05, or T 9:05–11 and R 9:05. Individual conferences arranged throughout the term. F. A. Herman.

This seminar is designed to help students (1) express themselves clearly and effectively and (2) acquire skills to better understand the ideas of others. Principles of the communication process are explored, tested, and reinforced during the term through classroom interaction, case studies, debates, and individual and group videotaped presentations.

**268 Written Communication** Fall or spring. 1 credit. Limited to 18 students. S-U grades only. Hotel elective.

W 7:30–9:20 p.m. (every other W). J. S. Livingston. A review of the principles of English composition,



including organization, paragraph construction, sentence structure, and word choice. Students write papers and discuss them in individual conferences.

**[361 Strategies for Business Writing]** Fall or spring. 1 credit. Limited to 24 students. Prerequisite: written permission of the instructor. Hotel elective. Not offered 1983–84.

F 2:30. D. A. Jameson, D. G. Flash, J. F. Lumley, C. Solomon.

Intended primarily as an alternative to Hotel Administration 165 for those transfer students who qualify, based on their performance in college writing courses and on qualifying examinations. The course will familiarize students with those aspects of writing special to the business world. It will emphasize organizational patterns, paragraph development, logic, style, and research methods used to prepare business memos and research reports.]

**364 Advanced Business Writing** Fall or spring. 2 credits. Limited to 14 juniors, seniors, and graduate students. Prerequisite for hotel undergraduates only: H Adm 165. Hotel elective.

T 9:05–11. D. A. Jameson.

This course focuses on the written communications that demand special persuasiveness and control of tone. Some examples of the kinds of communications that are analyzed, evaluated, and written are negative messages such as refusals, rejections, and responses to complaints; persuasive administrative messages to both subordinates and superiors in an organization; and sales letters and other promotion materials. How to plan and execute a job-hunting campaign, both before college graduation and later in one's career, is discussed. Students prepare résumés, letters of application, and follow-up messages adapted to their individual needs.

**469 T.A. Training in Communication** Fall or spring. 1–3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student who plans to be a teaching assistant in communication is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

## Science and Technology Courses

**171 Food Chemistry I** Fall. 3 credits. Required.

Lecs, M W F 8; 1-hour lab on R to be arranged. M. H. Tabacchi.

Principles and concepts of inorganic and organic chemistry, with emphasis on chemical reactions associated with fats, carbohydrates, and proteins. Heat transfer and energy as they relate to food chemistry are discussed.

**172 Food Chemistry II** Spring. 4 credits. Prerequisite: H Adm 171 or equivalent. Required.

Lecs, M W F 8; 3-hour lab to be arranged. M. H. Tabacchi.

The chemistry of fats, carbohydrates, and proteins is emphasized in relation to food products and food-production techniques. The roles of additives in food, colloidal phenomena, food processing, and reconstitution techniques are studied.

**173 Sanitation in the Food-Service Operation** Fall or spring. 2 credits. Required.

Lec, T 1:25; 2-hour lab to be arranged.

B. Richmond.

The causes and prevention of food spoilage and food-borne disease. Sanitary principles applied to the hospitality industry, including laws, rules, and regulations. Practice in general methods of microbiological testing, and isolating and characterizing organisms of importance in the food-service industry.

**174 Information Systems** Fall or spring. 3 credits. Required.

M 1:25 and W 1:25–3:20. R. Alvarez.

An introduction to information systems and computing machines. Students learn basic programming skills for application to selected business problems. The concept of file processing is introduced to provide the student with an understanding of computing as it applies to the hospitality industry. Programs are executed on the University's computing system.

**274 Hotel Computing Applications** Fall or spring. 3 credits. Prerequisite: H Adm 174 or equivalent. Hotel elective.

Lecs, T 2:30–4:25, R 1:25; 2-hour lab to be arranged. R. G. Moore.

The course exposes students to concepts of data-base management and management information systems as they relate to computing technology in the hospitality industry. Specific areas covered are hotel systems, wide-based reservations systems, communications, and food and beverage systems. Laboratories will provide actual experience with computer-based systems.

**371 Principles of Nutrition** Spring. 3 credits.

Prerequisites: H Adm 171 and 172 or equivalent chemistry courses. Elective.

M W F 10:10. M. H. Tabacchi.

Designed especially for students interested in the food industry. The nutrient composition of fresh and processed foods, nutrient handbooks, recommended daily allowances, nutrition labeling, additives, special diets, fad diets, and weight control are considered. The uses of nutrients and nutrient interactions are emphasized.

**374 Advanced Programming and Systems Design** Fall or spring. 3 credits. Elective.

Prerequisite: H Adm 174 or 774 or equivalent. T R 12:20, plus rec to be arranged. R. G. Moore.

Programming in Business Basic, an interactive, easily learned computer language commonly used on small business computers; installing a computerized business system and processing information; and designing a business computer system using data-base management programs on an IBM 5110 computer. The course is intended for students who expect to be working with computer systems and desire experience in hospitality electronic data processing.

**479 T.A. Training in Science and Technology** Fall or spring. 1–3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student who plans to be a teaching assistant in science or technology is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

**771 Graduate Food Chemistry** Fall. 4 credits. Required M.P.S. course.

Lecs, M W F 10:10; 3-hour lab to be arranged. Faculty.

The chemistry of fats, carbohydrates, and proteins is emphasized in relation to food products and food-production techniques. Additives in foodstuffs, colloidal phenomena, food processing, and reconstitution techniques are studied. Heat transfer and energy as they relate to food chemistry are discussed.

**773 Graduate Food Sanitation** Spring. 2 credits. Required M.P.S. course.

F 10:10–1. B. Richmond.

Sanitary principles applied to the hospitality industry; causes and prevention of food spoilage and food-borne disease; the moral and legal responsibilities of the food-service manager; training and education of personnel, based on application of sanitary techniques and procedures

**774 Computers and Hotel Computing**

**Applications** Fall or spring. 3 credits. Limited to 30 students. Required M.P.S. course.

Lecs, M 2:30–4:25, W 12:20; 2-hour lab to be arranged. R. Alvarez.

The first segment of the course is devoted to learning computer concepts and programming in Basic. During the second part of the course, the introduction of the computing machine to the hospitality industry is examined from several viewpoints: managerial impact, cost justification, user reaction, and guest satisfaction. The various successes and failures of hotel computing systems are analyzed in detail. Students in the course work with various small hotel and restaurant systems.

## Economics, Marketing, and Tourism Courses

**281 Macroeconomics** Spring. 3 credits. Required.

M W 10:10; 1-hour sec to be arranged. C. W. Hart. Modern economic problems are examined in historical perspective, as national issues, and in the economic context of business decisions.

**282 Microeconomics** Fall. 3 credits. Required.

T R 8:30–9:50. C. W. Hart.

An introductory look at the basis of production and consumption behavior, market structures, the pricing system, resource allocations, market failures, and public policies directed toward these failures.

**284 Introduction to Tourism** Fall. 3 credits. Also open to students outside the Hotel School. Not open to freshmen. Hotel elective.

T 1:25, R 2:30–4:25. M. A. Noden.

An introductory course in the study of tourism. The origins and evolution of contemporary tourism will be carefully examined. Students will be 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 upon destination development will be explored through the use of selected limited case studies. A series of guest lectures by well-known experts from the travel industry will highlight the economic operations and effects of tourism in both the public and private sectors. This course will serve as the principal prerequisite for the advanced course.

**285 Hotel Sales** Fall or spring, 7 weeks only. 2 credits. Hotel elective.

M W 2:30–4:25. Faculty.

A practical approach to the selling of hotel space, with particular emphasis on selling to and effectively serving groups.

**381 Advertising and Public Relations** Fall. 2 credits. Limited to juniors, seniors, and graduate students. Hotel elective.

F 11:15–1:10. Faculty.

This is the first of two courses covering the essential phases of hotel-motel marketing. Topics include advertising, publicity, public relations, and sales communication.

**382 Cases in Hospitality Marketing** Fall or spring. 2 credits. Prerequisite: H Adm 283 or 781. Hotel elective.

T 10:10–12:05. W. H. Kaven.

A case-study course focusing on market planning; marketing-strategy formulation; price, promotion, place, and product program design.

**383 Managing the Marketing Functions in the Hospitality Industry** Fall, 7 weeks only. 1 credit.

Limited to 30 students. Prerequisites: H Adm 283, 384, or 781 or written permission of instructor. Hotel elective.

T 2:30–4:25. W. Prigge.

The course examines all marketing functions in the hospitality industry, including market research, public

relations, advertising, sales, and the techniques that management may use to monitor performance in each function.

**384 Principles of Marketing** Fall or spring. 3 credits. Required.

T R 8:30–9:45. L. M. Renaghan.  
The principles of marketing as they apply to the hospitality industry. The primary emphasis is on strategy development and consumer decision making. A secondary aim is to show how the special nature of services affects the development of marketing strategies in the hospitality industry.

**481 Advertising Strategies** Fall, 7 weeks only. 2 credits. Limited to 50 students. Prerequisite: introductory courses in psychology and marketing or permission of instructor. Hotel elective.

M 1–4:30. P. C. Yesawich.  
Case histories of the advertising, publicity, business promotion, and public relations of hotels, resorts, restaurants, and national travel attractions are studied.

**483 Psychology of Advertising** Fall. 3 credits. Limited to 30 seniors and graduate students. Prerequisites: H Adm 111 and 384 or equivalent, or permission of instructor. Hotel elective.

M 2:30–5 and 7–9:30 p.m. (every other M). P. C. Yesawich.  
The principles of psychology employed in advertising. Topics include learning, perception, motivation, advertising research, consumer behavior, and advertising strategy.

**484 Tourism II** Spring 1984, spring and fall thereafter. 3 credits. Limited to 25 students per lab. Prerequisites: H Adm 281, 282, 284, and 384, or equivalents, or written permission of the instructor. Hotel elective.

Lecs. M W F 1:25; lab, (01) M 10:10, (02) W 10:10. M. A. Noden.  
An advanced course in the study of tourism. Emphasis will be placed on the development of the tourism industrial base and development and financing of superstructure and infrastructure. Econometric model development for demand predictions will be examined and analyzed. Students will be 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 of various tourism-generating areas will be used. Occasional guest lectures will be given by experts in both public and private sectors.

**489 T.A. Training in Economics, Marketing, and Tourism** Fall or spring. 1–3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.  
The student who plans to be a teaching assistant in economics, marketing, or tourism is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

**689 Problems and Opportunities in International Hospitality** Fall. 2 credits. Prerequisite: an introductory course in marketing. Hotel elective.

R 11:15–1:10. W. H. Kaven.  
This course, taught from a marketing management perspective, will explore topics unique to international hospitality. These include (a) the multinational corporation (MNC) and the hospitality industry: types, organization, trends, ownership; (b) working in the MNC: path, personality, pay, problems; (c) dealing with public relations and personal conflicts: human rights, terrorism, boycotts, and questionable payments; (d) examining global opportunities; (e) overcoming MNC marketing problems (e.g., very high or low airfares, repatriation, exchange fluctuation, expatriate visas, climate, operating style, work ethic, productivity, labor costs and standards, types and sources of demand). The course will include lectures from industry authorities, readings, appropriate cases, and discussion.

**781 Marketing Management** Spring. 3 credits. Required M.P.S. course.

T 1:25, W 2:30–4:25. L. M. Renaghan.  
The management of the marketing function in firms operating in the hospitality industry. The emphasis is on developing the student's organizational, analytical, and decision-making capabilities through involvement in case experiences and project presentations. No prior marketing knowledge is assumed.

**782 Strategic Market Planning in the Hospitality Industry** Fall or spring. 2 credits. Open only to graduate students and upperclass students with written permission of instructor. Prerequisite: H Adm 781 or equivalent. Hotel elective.

R 12:20–2:15. C. W. Hart.  
The application of strategic market planning concepts to firms involved in various aspects of the hospitality industry. Topics include the concept of corporate mission, using marketing concepts to establish corporate goals and objectives, techniques of analyzing businesses, and strategy formulation and implementation. These topics will be covered through the use of articles, readings, lectures, outside speakers, and case studies.

## Independent Research Courses

**600–680 Undergraduate Independent Research** Fall or spring. Variable credit. Prerequisite: written permission. Hotel elective. *Only the first three credits of directed study may count as hotel electives during the student's undergraduate academic career.* Additional directed study, if taken, is applied toward free electives, except for the management-intern program of 12 credits. *Permission in writing is required before course enrollment.*

Faculty.  
Students pursue independent research projects under the direction of a faculty member.

**600 Administrative and General Management**

**601 Management Intern Program I—Operations** 6 credits.

**602 Management Intern Program II—Academic** 6 credits.

**610 Human-Resources Management**

**620 Accounting and Financial Management**

**630 Food and Beverage Management**

**640 Law**

**650 Properties Management**

**660 Communication**

**670 Science and Technology**

**680 Economics, Marketing, and Tourism**

**700–900 Graduate Independent Research** Fall or spring. Variable credit. Limited to graduate students. Prerequisite: permission of instructor. *Obtain permission form from the school's graduate office.*

Faculty.  
The student plans a project and selects a faculty member willing to supervise the study.

**700 Administrative and General Management**

**710 Human-Resources Management**

**720 Accounting and Financial Management**

**730 Food and Beverage Management**

**740 Law**

**750 Properties Management**

**760 Communication**

**770 Science and Technology**

**780 Economics, Marketing, and Tourism**

**800 Monograph I**

**801 Monograph II**

**802 Master of Science Thesis Research**

**803 Graduate Teaching Internship**

**900 Doctoral Thesis Research**

## Faculty Roster

Alvarez, Roy, M.P.S., M.Ed., Cornell U. Asst. Prof.  
Beck, Robert A., Ph.D., Cornell U. Professor of Hotel Administration/Ecole Supérieure des Sciences Economiques et Commerciales  
Berger, Florence, Ph.D., Cornell U. Asst. Prof.  
Chase, Robert M., M.B.A., Cornell U. Prof.  
Christian, Vance A., M.S., Cornell U. Villa Banfi Prof.  
Clark, John J., Jr., Ph.D., Cornell U. E. M. Statler Prof.  
Colucci, Antoinette L., M.S., Purdue U. Asst. Prof.  
Dermody, Donal A., M.S., Cornell U. Prof.  
Dunn, David C., Ph.D., Cornell U. Assoc. Prof.  
Eyster, James J., Ph.D., Cornell U. Assoc. Prof.  
Ferguson, Dennis H., Ph.D., Cornell U. Asst. Prof.  
Gaumnier, Paul L., M.S., Cornell U. Prof.  
Geller, A. Neal, Ph.D., Syracuse U. Assoc. Prof.  
Hart, Christopher W., Ph.D., Cornell U. Asst. Prof.  
Henry, Charles, M.B.A., Cornell U. Asst. Prof.  
Herman, Francine, M.S., Cornell U. Assoc. Prof.  
Jameson, Daphne A., Ph.D., U. of Illinois. Asst. Prof.  
Kaven, William H., Ph.D., Cornell U. Prof.  
Kelly, Thomas J., M.S., Cornell U. Asst. Prof.  
Knight, John B., M.B.A., U. of Toledo. Assoc. Prof.  
Moore, Richard G., M.B.A., Cornell U. Assoc. Prof.  
Mulkoski, Stephen A., Ph.D., Cornell U. Assoc. Prof.  
Penner, Richard H., M.S. Arch., Cornell U. Assoc. Prof.  
Rainsford, Peter, Ph.D., Cornell U. Assoc. Prof.  
Redlin, Michael H., Ph.D., Cornell U. Assoc. Prof.  
Renaghan, Leo M., Ph.D., Pennsylvania State U. Assoc. Prof.  
Sherry, John E. H., L.L.M., New York U. Assoc. Prof.  
Tabacchi, Mary H., Ph.D., Purdue U. Asst. Prof.  
Waters, F. Michael, M.B.A., Harvard U. Asst. Prof.

## Adjunct, Visiting, and Other Teaching Staff

Barnford, Carl, A.O.S., Teaching Associate  
Compton, Richard A., M.S., Senior Lecturer  
D'Aprix, David, B.S., Lecturer  
David, Betty B., Lecturer  
Degan, Melissa, A.O.S., Teaching Associate  
Flash, Dora G., A.B., Lecturer  
Hanson, Bjorn, M.B.A., Visiting Assoc. Prof.  
Heist, Anne, M.S., Lecturer  
Lumley, Jane, M.A., Lecturer  
McNeill, Keith, B.S., Lecturer  
Noden, Malcolm A., Lecturer  
Norkus, Gregory X., B.S., Lecturer  
Nowlis, Michael R., B.S., A.O.S., Lecturer  
O'Connor, Therese A., B.S., Lecturer  
Panarites, Peter, J.D., Visiting Assoc. Prof.  
Prigge, William, B.S., Visiting Assoc. Prof.  
Records, Harold A., M.B.A., Visiting Lecturer  
Richmond, Bonnie S., M.S., Lecturer  
Schmidt, Brian, B.A., Lecturer  
Sciarabba, Andrew, B.B.A., Visiting Lecturer  
Sher, David, M.B.A., Visiting Assoc. Prof.  
Solomon, Cathy, M.A.T., Lecturer  
Weisz, Steven, B.S., Visiting Lecturer  
White, Robert, A.O.S., Teaching Associate  
Whitehead, Donald E., B.S., Lecturer  
Yesawich, Peter C., Ph.D., Visiting Assoc. Prof.

## New York State College of Human Ecology

### Administration

Jerome M. Ziegler, dean  
 Nancy Saltford, associate dean; assistant director,  
 Cornell University Agricultural Experiment Station  
 Lucinda A. Noble, associate dean; director of  
 Cooperative Extension  
 Carol L. Anderson, assistant dean; associate director  
 of Cooperative Extension  
 Carolyn Cook, director, alumni affairs  
 Brenda Bricker, director, admissions  
 Joyce McAllister, registrar  
 Clarence H. Reed, director, special educational  
 projects  
 Timothy K. Stanton, director, Field Study Office  
 Lynne M. Wiley, director, Placement Office  
 Nevart Yaghlian, director, Counseling Office

### Facilities

The College of Human Ecology 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 physical plant includes administrative offices, faculty offices, classrooms, auditoriums, and lecture halls; wet chemistry and biochemistry laboratories for nutrition, food science, and textile science; household equipment laboratories; experimental food laboratories; design studios; woodworking shops, a children's creative-art laboratory; 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 (human development and family studies, home economics education, interior and product design, nutritional sciences), 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 such as an Instron; 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.
Social Planning and Public Policy	B.S.
Individual Curriculum	B.S.

### The Students

The College of Human Ecology undergraduate enrollment is 1200, with 53 percent in the upper division. About 320 students are graduated each year: about 250 freshmen and 100 transfer students

are admitted. About 100 faculty members serve as advisers for undergraduates. About 200 graduate students have members of the college's faculty chairing their special committees.

The college admissions committee selects applicants who are academically well prepared and appear most likely to profit from the college's various curricula. About fifty master's degrees and thirty doctorates are awarded each year. Admissions is selective; about 73 percent of the freshmen were in the top 10 percent of their high school graduating classes. Mean Scholastic Aptitude Test (SAT) scores for freshmen accepted in fall 1982 were 567 verbal and 604 mathematics.

Approximately 80 percent of the student body comes from New York State, with the remainder from other parts of the United States or abroad. Fourteen percent are identified as members of minority or ethnic groups.

### Students of Mature Status

The college recognizes that students who interrupted their formal education and are returning to school have problems 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 also are permitted to extend their residency beyond the normal eight terms.

It is highly recommended that mature students contact Vivian Geller, the director of Continuing Education Information Center, 158 Olin Hall, for information on services 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 educations and are considering completing degree programs. Students accepted in the nondegree 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 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 Courses, 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 the Empire State College "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.

### 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. Talking with 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 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 green 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 need to work closely with a college counselor who is available for planning and referral to department resource faculty.

### Consumer Economics and Housing

Increasing concern with the welfare of the consumer in society is evident at all levels of government and in private industry. The Department of Consumer Economics and Housing (CEH) offers students an opportunity to focus on social and economic policies affecting individuals and families. The program encourages an understanding of economics and sociology, particularly as they relate to the consumption of both privately and publicly supplied goods and services. Students who complete their undergraduate work in this department are well prepared for a variety of positions within a developing field of consumer-related work in business, banking, real estate, and public and consumer relations.

The CEH major is flexible and allows individual program planning. All students majoring in consumer economics and housing are assigned a faculty adviser by the advising coordinator. The earlier a student decides to major in the department, the greater the opportunity to develop a program that will meet individual educational or career goals. Transfer students are urged to discuss their plans with a faculty adviser as soon as possible. An appointment to talk with either an adviser or the advising coordinator, Ramona Heck, may be made directly with the faculty member.

**Interdepartmental Major in Social Planning and Public Policy.** The Department of Consumer Economics and Housing participates in the Interdepartmental Major in Social Planning and Public Policy with the Department of Human Service Studies. See the description of the major, p. 295.

### Options

Two options are offered to undergraduates majoring in the department: consumer economics or housing. Either provides excellent preparation for employment in government, business, and continuing education programs such as cooperative extension. They also provide an excellent undergraduate foundation for further studies in law, economics, and business.

In addition to courses to be taken within the department, each option presents alternatives for the thorough development of a related interest.

#### Option I: Consumer Economics

Consumer economics is concerned with the economic behavior and welfare of consumers in the private and public sectors of the economy: how consumers allocate their scarce resources, especially

time and money. This option requires an understanding of the market economy, of consumers' rights and responsibilities, and of household production, consumption, and management. Graduates may choose to work in government agencies providing consumer services, in business and industry, or in consumer-related community programs.

#### Option II: Housing

Housing, a major societal problem, is studied through an interdisciplinary approach that includes sociology and economics. The sociological approach considers the interplay between housing demand and population trends, analyzing such contemporary issues as residential segregation and population mobility. The economics of housing familiarizes the student with the operations of the housing market, including supply and demand, production and consumption, and finance. The role of federal, state, and local governments in designing and implementing housing policies is scrutinized. Careful analysis and evaluation of housing research are stressed.

## Design and Environmental Analysis

The Department of Design and Environmental Analysis (DEA) is concerned with creating, selecting, and managing the quality of our near environment. The program of the department emphasizes the interaction between environments and people: the needs of individuals, families, and other groups as they affect and are affected by the space, objects, and materials around them.

Options are based on subject matter in:

- 1) *Design*—the manipulation of form, space, and color to solve aesthetic and functional problems;
- 2) *The physical sciences*—the chemical, physical, and structural properties of materials such as textiles and plastics; and
- 3) *The social sciences*—psychological, sociological, and managerial analyses of our relationship to the physical environment.

Diverse faculty backgrounds and teaching approaches lead to multidisciplinary problem solving and development of creative abilities, aesthetic judgment, and analytical thinking of students.

Laboratory and studio facilities permit exploration of textiles and other materials, and design concepts through analytical and creative problem-solving techniques. The relationship between humans and their surroundings is explored through a combination of academic courses, field experience, and applied research. Examples of student class projects, faculty work, and items from the Cornell Costume Collection are frequently on display in the department's galleries and exhibit case. The DEA Resource Center includes books, journals, materials samples, and self-instructional videotapes for student use. Items from the Costume Collection are made available to students as necessary for classroom and special study projects.

All DEA majors are assigned a faculty adviser during their first semester by the advising coordinator, Anita Racine, 3M4 Martha Van Rensselaer Hall, on the mezzanine. Consultation with faculty advisers about future goals, department requirements, sequences of courses, and electives inside or outside the college to meet special needs helps students develop their programs.

## Options

The department offers undergraduate education in five professional areas: interior design, apparel design, textiles, apparel and textile management, and human-environment relations.

To take full advantage of the course sequences, it is important to select an option as early as possible. This is particularly true in the design options and in the apparel textile management option, which specify more credits in the major fields than do the other two options. Transfer students in the two design options or the textiles option may need one or two extra semesters to complete the program.

#### Option I: Interior Design

This 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 option V.

Careers are available in interior design and space planning, interior architecture, facility planning, housing, and building technology. This program also serves as an excellent preparation for graduate study in interior design, facility management, and architecture.

#### Option II: Apparel Design

The option in apparel design focuses on both fashion and functional considerations in the design of body coverings. The program emphasizes a problem approach that enables the student to integrate knowledge of design, human-environment relations, and textiles in the apparel design process. Some students combine this option with option III. The program also serves to prepare students for graduate study in apparel design and textiles and clothing.

Graduates have found challenging employment in the textile and apparel industries, in independent and government-sponsored research projects, and in community organizations.

#### Option III: Textiles

Students explore the chemical and physical structures and properties of textiles, textile products, and other materials. Supporting courses are found in physical sciences, design, human-environment relations, and consumer economics and housing. Some students combine this option with option II. The program gives excellent preparation for graduate study in many fields, including textile science and technology, business, public policy, consumer affairs, and apparel design.

Careers are available in the fiber and textile industries, government, and education. Recent graduates are active in new product development and evaluation, research, technical marketing services, consumer information, and product safety.

#### Option IV: Apparel and Textile Management

The fields of textiles and apparel, or textiles and interior design, are combined with those of business management and organizational policy. Students learn to apply theoretical and scientific information to find practical solutions by using a problem-solving approach. Courses are drawn from many related disciplines and include history, visual design, textile science, business management, human development, economics, and experiences in the field. Students learn to work effectively with professionals from a wide variety of disciplines, including textile science, design, manufacturing, state and federal regulatory agencies, and retailing.

#### Option V: Human-Environment Relations

Human-environment relations focuses on the interaction between people and their physical surroundings. There are two directions within this option that students may choose to pursue: (1) *applied research* and (2) *facility planning and management*. Both concentrations seek to expand our understanding of how the environment affects human perception, cognition, motivation, performance, health, safety, and social behavior. How human

capabilities or characteristics such as family structure, life-style, social class, and stage in life cycle affect environmental needs and requirements is also a focus of the program. The applied research concentration is good preparation for graduate study leading to a Ph.D. in the social sciences and a career in academic or other research-oriented settings in both the public and private sectors. It can also serve as the basis for graduate study in an environmental planning or design discipline such as architecture, landscape architecture, or city and regional planning. Electives in the social sciences and in research methods and statistics are appropriate. The facility planning and management concentration has a more immediate career focus. While a Master's or Ph.D. degree will increase a student's career options, a major in human-environment relations with a concentration in facility planning and management can open significant career opportunities immediately upon graduation, particularly in the private sector. Electives that focus on business, space planning, and management are appropriate for this concentration. In all cases, courses should be selected in consultation with the faculty adviser and the student guide.

## Human Development and Family Studies

The programs of the Department of Human Development and Family Studies (HDFS) are concerned with how people develop and change throughout the entire life span. 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 situational and environmental conditions of everyday life—is featured in many departmental courses.

Major social sciences 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, public service, 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 medicine, law, counseling, clinical psychology, special education, or university teaching and research, which require some graduate study. Others may take bachelor's-level positions as youth counselors, day-care workers, personnel assistants, research technicians, or social program assistants. The department does not offer programs leading to teaching certification at any level.

## The Curriculum

HDFS majors may take a broad and general program or a more specialized one. Areas of specialization available within HDFS include infant, child, adolescent, and adult development; atypical 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, business, or government.

During their first two years, students are expected to combine a variety of liberal arts courses with three HDFS core courses, HDFS 115 (Human Development: Infancy and Childhood), HDFS 116 (Human Development: Adolescence and Youth), and HDFS 150 (The Family in Modern Society). This encourages breadth and 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 required to participate in an experiential learning course that may focus on a naturalistic or laboratory setting (e.g., nursery school, youth detention center, county court) or on a research setting (e.g., interviewing).

An HDFS major also takes at least one second-level course in each of three areas: cognitive development, personality-social development, and family and society.

### 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 notify the director of the Honors Program during the second term of their sophomore year, although students may enter at a later date with special permission from the honors director.

A grade-point average of 3.5 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 a course in experimental research design before their senior year.

Students spend their senior year working on a thesis under faculty supervision, completing the project by the end of April. All thesis work must be completed by May, when the student's oral examination is held. More information is available in the department chairperson's office, NG14 Martha Van Rensselaer Hall.

## Human Service Studies

The curricula in the Department of Human Service Studies (HSS) prepare students for professional careers in human services. Graduates of the department are prepared for a variety of professions, including home economics teaching, social work, health, and various community education activities. HSS graduates work in schools, social agencies, cooperative extension services, and community development agencies that serve children, youth, the elderly, and families. The range of career opportunities depends both on the option and on electives chosen to meet individual career objectives.

HSS is unique in that it integrates a broad spectrum of studies, offered by several departments and colleges, and focuses them for professional practice in the human services.

All HSS students take three core courses that together provide a knowledge base for understanding the community and community services, organizational behavior and group processes, program planning, and research analysis. Regardless of their specific professional goals, students acquire an understanding of other professions, their commonalities and differences, and the ways they can collaborate to improve the human condition. Every student in the department is required to have a supervised field experience directly related to his or her career objectives.

The Department of Human Service Studies participates in the Interdepartmental Major in Social Planning and Public Policy with the Department of Consumer Economics and Housing. In this major the students acquire knowledge and skills to assess local and regional needs and to develop, implement, and evaluate policies and plans for meeting those needs and learn to work as professionals in state and local agencies. (See the section on Interdepartmental Major in Social Planning and Public Policy.)

### Academic Advising

The curricula in HSS are demanding; each of the HSS options requires breadth and depth in several areas. The core courses (HSS 202, HSS 203, and HSS 292) must be taken in the freshman and sophomore years, and prerequisites for each of the options should be completed before the junior year, if possible. (Special provisions are made for junior transfers.) Each

student must have a practicum supervised by HSS faculty that is tied directly to his or her professional preparation.

It is important for a student who is interested in majoring in human service studies to declare that major and select an option as early as possible. Once the major is declared, the departmental advising coordinator, Edythe Conway, assigns an adviser from the HSS faculty. A student who is unsure about which option to pursue should talk with a faculty adviser. With judicious planning, opportunity to change options or the major can be built into the program. When an option is changed, the student is reassigned to an appropriate adviser for that program. Students are free to change advisers. Although advisers must sign the green 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.

### Options

Two options are available in the department:

(1) human ecology education and (2) social work.

Students who elect the option in human ecology education focus on the educator's role in a variety of organizational settings (schools, cooperative extension, social and government agencies, and business) with learners of all ages. Students may choose to emphasize education in community agencies and/or the teaching of home economics in a school or a nonschool setting. Students who wish to teach home economics in schools (kindergarten through twelfth grade) select a sequence of courses that meet New York State certification requirements.

Students who pursue the accredited social work option are prepared for entry-level jobs in social work and are eligible to apply for a year's advanced standing in graduate schools of social work.

#### Option I: Human Ecology Education

This option prepares participants to plan, implement, teach, and evaluate innovative educational programs in formal and informal learning environments. Students from this option may take positions in cooperative extension; schools; outreach programs (teen-age pregnancy centers, half-way houses, programs for the elderly, consumer and homemaking programs); programs serving the educational, cultural, and economic special-needs populations; community centers; continuing education centers; and business and government agencies.

Course work combines a liberal education with professional preparation for the role of educator and integrates field-based learning to link theory with practice.

**Areas of concentration.** Building on the human ecology core taken early in the program, students select an area of concentration that provides in-depth work on a problem area with subject matter that may cut across departments. Areas of concentration are planned with the faculty adviser around the following subjects.

**Human and family development** focuses on the development of the individual from childhood to adulthood within the framework of the family. Course work centers on biological, psychological, and social human development; role allocations; value systems; interpersonal family relationships; parent education; contemporary family forms; and integration of current issues related to human and family development.

**Consumer education and resource management** studies problems related to acquiring and using consumer goods in the context of family decision making and ways family members of all ages could function more effectively in an economic society and considers policy decisions related to consumer protection.

**Design and the near environment** explores the relationship between physical environment and the behavior of individuals and groups. Basic needs, comfort, durability, safety, ease of care in housing, furnishings, textiles, and clothing are studied. Creating an environment for growth also considers personal and family and community space, ways cultural heritages contribute to the choice of housing and manner of dress, and how physical arrangements influence the environment and life-styles at home and at work.

**Nutrition/health/mental health** focuses on understanding humans in their biological, physical, and psychological environments.

**1) Nutrition/health** studies nutritional needs accompanying the physiological changes during the life span; problems encountered in providing food; the relationships among food, health, and human physiological needs; and sociocultural systems and their significance for program planning in nutrition and health.

**2) Health/mental health** studies the problems encountered by the developmentally disabled and emotionally disturbed, the effect of these problems on the family, and the position of these persons in American society. Also studied are the physiological-nutritional and the psychological-social contributors to problems incurred by these people, ways of changing the attitude of the public toward such persons, and means of identifying and developing community resources and programs available to these individuals and their families.

**Career clusters.** In addition, students select one of the following career clusters: cooperative extension, media and computer technology, target populations, or teacher certification in home economics. By choosing a career cluster students focus the selection of courses and field learning based on their individual interests. Students are advised to plan early with their faculty adviser for their area of concentration and career cluster. Faculty advisers will help plan work that may include courses from basic disciplines or other departments, tutorials, fieldwork, and research.

Human ecology education students strive to improve the quality of life for individuals, families, and communities by using a wide range of educational processes in carrying out programs focused on families, human development, and decision making.

Students who wish to teach home economics in schools select a sequence of courses that lead to a certificate of qualification for teaching kindergarten through twelfth grade in New York State and many other states. This certificate is exchanged for a provisional certificate when the student takes a home economics teaching position. Permanent certification requires two years of teaching experience and a master's degree. Students who want to qualify for certification in other states or in New York City should investigate the special requirements of each. Most can be met by making careful choices of electives.

**Internship.** Each student spends part of a semester in the senior year (or the preceding summer) in a supervised field setting. The student and the faculty adviser plan the internship to fit the student's specific interests and career goals. An effort is made to provide students with a variety of opportunities, including work with different economic, intellectual, and age groups, in formal and informal settings, and in traditional and innovative programs.

Students often live in the community in which their internships take place. Their work is guided by staff of the local agency, school, or business and is supervised by college faculty. Occasionally, two placements can be arranged to suit student career goals. For students desiring home economics teacher certification, one placement must be in a school setting.



### Option II: Social Work

The undergraduate program in social work at Cornell has three major goals: to prepare students for positions in the field that do not require advanced degrees; to prepare students for graduate education in social work; and to contribute to the enrichment of a general college education by helping students understand social-welfare needs, services, and issues.

The social-work curriculum is based on the biological and social sciences, the humanities, and three core courses in the department, HSS 202, HSS 203, and HSS 292. These requirements are generally completed during freshman and sophomore years.

Introductory courses in social work, HSS 370, Introduction to Social Welfare as a Social Institution, and HSS 246, Ecological Determinants of Human Behavior, should be taken in the sophomore year as prerequisites for HSS 471–472, Social-Work Practice, in the junior year. A grade of C+ or better in the introductory courses (HSS 246 and HSS 370) is required to continue in the option. Students who do not achieve these grade levels may change to other options.

HSS 471–472, Social-Work Practice, is a year-long methods course that includes fieldwork. Students are placed with agencies within a fifty-mile radius of Ithaca. Students spend Tuesdays and Thursdays in the field and Mondays and Wednesdays on campus in seminars. Students are expected to pay the costs of transportation, but the department will reimburse part or all of the travel costs of placements outside the Ithaca area to the extent that fiscal resources will permit. A driver's license is highly desirable. Students must have permission of the instructor to register for HSS 471. Satisfactory work in the field placement and a grade of B– or better is required in HSS 471 for a student to continue with HSS 472. Students who do not achieve a B– or better in HSS 471 are allowed the opportunity to follow an individualized HSS option that is not accredited by the Council on Social Work Education. Students with an individualized option plan their remaining requirements with the assistance and approval of their faculty adviser.

The social-work program is accredited by the Council on Social Work Education. Students who complete all requirements are eligible to apply for advanced standing in graduate schools of social work or for beginning-level employment as professional social workers.

## 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 two 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, and social policy and human services. The other basic requirements of the college must also be met. Programs incorporating these 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 Social Planning and Public Policy

The legislative trend in the United States that is moving public policy development from the federal to the state and local levels emphasizes the need for trained personnel in social planning and public policy. The Interdepartmental Major in Social Planning and Public Policy is designed to meet this need. The program is sponsored jointly by the Departments of Consumer Economics and Housing, and Human Service Studies.

Students increase their knowledge of (1) the historical development of, and the current issues in, social planning and public policy; (2) the ways policies and plans are formed, implemented, evaluated, and changed; (3) social systems, from the structure and functioning of contemporary society to the dynamics of individual and group behavior; and (4) values that help foster and maintain some policies and plans rather than others.

Students electing this major have opportunities to improve their skills in policy analysis, evaluative research, developing information systems, engaging consumers in the planning and policy-making process, and budgeting. The foci on policy and planning also make this major very attractive to students wishing to use it as a prelaw or pregraduate business program.

Faculty advisers whose interest and experience lie in the fields of social planning and public policy are available to counsel students on career goals and to help plan curricula.

Advising coordinators Keith Bryant and Alan Hahn will be glad to answer questions about the advising system.

### Options

Two options are available in the major; a student selects the one most suited to his or her interests and career plans and completes the necessary requirements. Either option prepares a student for graduate or professional study.

**Option I: Social Planning.** The option in social planning prepares students for careers in planning the organization and delivery of human services. Social planners are employed in local, regional, and state planning agencies and assist public and private health and social agencies in the design, development, and evaluation of regional and local programs.

**Option II: Public Policy.** This option is planned for students who are primarily interested in the evaluation of public policy alternatives, especially implications of these policies for consumers and households. Graduates may build careers as researchers or policy analysts in planning departments or other public or private agencies at the local, regional, state, or federal level in areas related to housing, welfare, income and employment, or consumer affairs.

## Individual Curriculum

Students in the college who find that none of the major curricula meets their educational objectives may want to investigate designing their own program of study. An individual curriculum must be within the focus of the college and must be better suited to a student's objectives than an existing major. The

individual program must include at least 40 credits in human ecology courses and may not exceed the normal number of credits allowed in the endowed divisions of Cornell.

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 always before the second semester of the junior year.

If objectives meet the requirements, the student should discuss plans with a counselor. If an individual curriculum seems a possibility, Barbara Morse, in the Counseling Office, will help the student formally develop a program.

## 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.

### Human Ecology Field Study

Field study enables students to learn from participation in a community or organizational setting and from reflection on that experience through discussion, reading, and writing. This process of integrating theory with practice distinguishes field study from work experience and provides the rationale for granting academic credit.

The Human Ecology Field Study Office, 159 Martha Van Rensselaer Hall, offers interdepartmental, 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., and elsewhere. Field Study Office courses are open to registration by all Cornell students.

### Human Ecology International Program

The International Program 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 occasional intersession study tours. In addition, opportunities for in absentia study abroad, as well as cooperative arrangements between the College of Human Ecology and overseas universities, enable students to undertake foreign study as an integral part of their Cornell program. Course work in the foreign institution will, in general, be planned to increase knowledge of the people and institutions of the country concerned; field work will provide guided experience in family, community, or agency situations in an area related to individual student interest in human ecology. A core course in the college, HE 360, Preparing for International or Intercultural Experience, assists students in developing the skills necessary for effective cross-cultural interaction and enables students to become oriented to the nations, regions, and cultures in which they intend to work and study. Interested students should contact the International Program Office in 153 Martha Van Rensselaer Hall.

## 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 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 Counseling Office and in the Office of the College Registrar.

#### Center for International Studies, and Women's Studies

Courses that have been approved by the faculty of the College of Human Ecology for credit are posted in the Academic Resource Center, N101 Martha van Rensselaer Hall. Other courses offered in these special programs may not be taken for credit unless permission is obtained through petition to the director of special educational projects.

### Dual-Registration Programs

#### Graduate School of Business and Public Administration

A limited number of highly qualified students from Cornell undergraduate divisions, including Human Ecology, may be accepted by the Cornell School of Business and Public Administration after the junior year. Students need the approval of the B&PA admissions office and the director of special educational projects in the College of Human Ecology. Accepted students should be aware that if the B&PA 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.

#### 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 insure 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's director of special educational projects.

#### 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 the Career Center, 14 East Avenue.

### 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 Study Office

#### 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 Joyce McAllister, 146 Martha Van Rensselaer Hall.

## Planning a Program of Study

### 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 Placement Office and to seek recommendations from faculty associated with the options completed.) Majors include the following options.

*Consumer Economics and Housing (CEH):* consumer economics, housing.

*Design and Environmental Analysis (DEA):* interior design, apparel design, textiles, apparel and textile management, human-environment relations.

*Human Development and Family Studies (HDFS)* does not have specific options. Courses focus on cognitive, personality, and social development; infant through adolescent development; atypical development; and family studies.

*Human Service Studies (HSS):* human ecology education, social work.

*Nutritional Sciences (NS):* experimental and consumer food studies, nutrition, nutritional biochemistry, clinical nutrition, community nutrition. (By careful planning, students may also meet the minimum academic requirements of the American Dietetic Association.)

*Interdepartmental Major in Biology and Society (ID-BS).*

*Interdepartmental Major in Social Planning and Public Policy (ID-SPPP):* social planning, public policy.

*Individual Curriculum:* It is possible to develop an individual program of study if none of the above programs fit 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 the College Registrar, 146 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.

### Completing a Major

A summary of record is kept for each student in the Office of the College Registrar. 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 the College Registrar. 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 overseas often find it necessary to be proficient in another language. For more detailed information, see the Advanced Placement of Freshmen section.

## Graduation Requirements

To graduate, students need to:

- 1) meet college credit and distribution requirements,
- 2) complete the requirements for a major,
- 3) achieve a cumulative average of 1.7 (C-) or better,
- 4) fulfill residency requirements, and
- 5) fulfill the physical education requirement.

### College Requirements

These are the general areas of study and specific courses and credits required of every student in the college.

#### 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; or 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; and HDFS 115, 116, 117); sociology (including rural sociology, CEH 148, and HDFS 150 and 307). Do not take Economics 101 and CEH 110; Economics 102 and CEH 111; or Psychology 101 and Education 110; they are equivalent courses.

- C. *Additional credits* (12 credits) selected from any subjects listed above or with 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 Seminars* (6 credits) selected from courses listed in the Freshman Seminar brochure, which may be obtained at 159 Goldwin Smith Hall.
- B. *Additional credits* (9 credits) selected from art; communication arts; 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 I&LR 210 and Agricultural Economics 310, since the courses are substantially the same); theatre arts; DEA 101 or 115; or HSS 292.

## III. Human Ecology (40 credits)

- A. *Requirements for the major* (the number of credits required varies by major and option).
- B. *Course work in at least two departments outside the major* (15 credits) including at least 6 credits or two courses in one department outside the major.

## 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
- Graduate School of Business and Public Administration

*Courses in the endowed divisions in this section may not exceed a total of 21 credits. If Economics 101 or 102, Psychology 101, or Sociology 101 or 107 are selected to meet requirements for section I, credits in the endowed divisions allowed for section IV will be reduced accordingly.*

## 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 a 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 receive credit from the advanced placement examination in English are still held for the Freshman Seminar requirement.

**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 these sections may either be used as meeting the credit requirements in these sections or be applied toward the additional credits in section IV.

**In sections I, II, and III-B,** students are permitted to lack 1 credit toward meeting the requirements. For example, 14 instead of 15 credits of human ecology courses may have been taken outside the major department, or 23 instead of 24 credits of courses in the natural and social sciences may have been taken; however, the minimum total of 120 credits (exclusive of physical education) must be met.

**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. If Economics 101, 102; Psychology 101; Sociology 101, 107 are selected to meet requirements for section I, credits in the endowed divisions allowed for section IV will be reduced accordingly. Any course taken in an endowed division for which a grade of F or U is received will also be counted against 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 against the 21 credits allowed in the endowed divisions in meeting the requirements of this section.

Not more than 21 credits may be taken in the endowed divisions of the University except under both of the following conditions:

- 1) The students 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 credits are passed*. In 1983–84 the fee will be \$210 per credit.

### Related Policies for Transfer Students

**Natural sciences.** Transfer students entering before spring 1983 who lack preparation in biology and either chemistry or physics, either at the high school or college level, must make up this deficiency before registering for their *third* semester in the college. Deficiencies may be made up either through successful completion of Cornell courses or courses taken elsewhere at either the high school or college level. A semester college-level course in the appropriate science is considered equivalent to a high school unit and counts as credit toward graduation requirements.

Effective spring 1983, students applying as undergraduates who do not have the required academic unit in biology, chemistry, or physics are required to show evidence of having made up this deficiency prior to matriculation in the college.

**Section I-A.** Transfers who are entering human ecology programs in consumer economics, housing, social planning, public policy, or human development and family studies 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 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 Seminars. Students who have not fulfilled this requirement before transferring must fulfill it at Cornell.

**Section III-B.** Transfer students can meet the requirement for course work outside the major in the College of Human Ecology by completion of:

- 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 allowed to meet this requirement), based on the status of the student's matriculation and prorated as follows:

Cornell Human Ecology Credits to Satisfy Work outside the Major	
Status at Matriculation	
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 with two courses or 6 credits in one department.

Note that transfer students are still responsible for completing a total of 40 human ecology credits.

**Section IV.** Transferred credits for courses applied toward electives do not reduce the 21 Cornell endowed credits that students are allowed. Any grade below C– will not transfer for a major requirement or a distribution requirement. Such courses will transfer only as elective credit.

**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 or postponement from physical education, students should consult the college registrar, Joyce McAllister, in 146 Martha Van Rensselaer Hall.

### Related Policies for Freshmen

**Natural sciences.** The college recommends that freshman entering before spring 1983 complete a unit of biology and either a unit of chemistry or physics before they matriculate. Entering freshmen who lack a unit of biological or physical science must make up this deficiency before they register for their *fourth* semester. A semester-long college-level course in the appropriate science is considered equivalent to a high school unit and counts as credit toward graduation requirements.

Effective spring 1983, students applying as undergraduates who do not have the required academic unit in biology, chemistry, or physics are required to show evidence of having made up this deficiency prior to matriculation in the college.

**Section V.** Freshmen are required to take two semesters of physical education during their freshman year.

### 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 registrar at the beginning of the semester so that their summaries of record may be prepared and their names 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 written request to the director of special educational projects. The request 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 director of special educational projects 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 the director of special educational projects. Approval may be given under certain circumstances. For example, transfer students may have problems scheduling courses to meet college distribution requirements, and the director of special educational projects may approve alternative courses. If the requirement for which the student seeks exemption is one specified by the major, the director of special educational projects will refer the petition to the department for consideration.

Petition forms are available in the Counseling Office, N101 Martha Van Rensselaer Hall.

## Procedures

### Course Enrollment

Students are expected to complete course enrollment during a designated period each semester. Failure to do so carries a \$10 penalty, which can be waived only if circumstances are completely beyond the student's control. It is the student's responsibility to find out the dates of course enrollment.

Before or during course enrollment, students talk to a department adviser or counselor or both about their program plans. Students must have their course enrollment schedule signed by their departmental major faculty adviser or by a college counselor if they have not declared a major. A listing of course changes plus directions for course enrollment are issued by the Office of the College Registrar before the start of course enrollment. Last-minute course changes are posted in that office as well as in the

Counseling Office, N101 Martha Van Rensselaer Hall. Students will also need the *Course and Time Roster*, issued by the Office of the University Registrar each semester before course enrollment.

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. A specified time for enrolling in such courses is listed on the orientation schedule given to all new students. 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.

Freshmen and transfer students registering 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 courses for fall semester in March or April; for spring semester in October or November preceding the beginning of the term. Course enrollment materials are mailed to each new student; continuing students are notified of course enrollment dates by posters and notices in the *Cornell Daily Sun*. Course enrollment materials are available from the Counseling Office and must be completed and filed in the Office of the College Registrar by the announced deadline.

### Permission of the Instructor

Certain courses may be taken only with the permission of the instructor, as indicated in the course descriptions. The instructor's permission must be obtained before the student enrolls in the course. After giving permission, the instructor initials the green course enrollment schedule or signs the optical-mark course-enrollment form that can be obtained from the Office of the College Registrar or the Counseling Office.

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 School of Business and Public Administration are required to obtain permission of the instructor on a course authorization form that the student then files with the school's registrar, 312 Malott Hall.

### Special Studies Courses

Each department in the College of Human Ecology offers special studies courses that provide an opportunity for students to do independent work not available in regular courses. One of these, 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. These 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 to enroll in the appropriate course number (300, 400, 401, or 402) for the special project.

Students who want to take a special studies course must talk with the faculty member under whose supervision the study would be done and then prepare a plan of work. If the faculty member agrees to supervise the study, a multicopy special studies form must be filled out, describing the study to be pursued. Signatures of the instructor and the department chairman as well as the student's departmental adviser must be on the form before it is taken to the office of the college registrar, where the student will officially register for the course by filling out an optical-mark course-registration form. Forms and instructions are available in the Counseling Office.

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 permission, the student attaches a note to the hardback green course schedule, citing reason(s) for carrying a heavier load, before handing it in to the Office of the College Registrar.

*Credits beyond 15 may be added during the change-of-registration period at the beginning 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 Counseling Office.

Students who petition *before the beginning of the term* to carry less than 12 credits may be eligible for proration of tuition. To apply for proration, students obtain a form from the bursar's office in Day Hall or from the Office of the College Registrar. After the petition to carry less than 12 credits is approved, the proration form signed by the college registrar must be returned to the Office of the Bursar, 260 Day Hall.

Students of mature status may carry 6 to 11 credits without petitioning. 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 the College Registrar, 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. The student's professional goals may be considered. Those students not admitted to a course may be placed on a waiting list and will find a note to that effect attached to the course enrollment printout.

### Late Course Enrollment

Students who fail to enroll in courses by the deadline must normally wait until the beginning of the semester to enroll and must pay a \$10 fee. Extensions are sometimes granted if requested from the college registrar before the end of course enrollment. Students who fail to meet the deadline for any reason should see the college registrar as soon as possible. In some cases, if the delay was absolutely unavoidable, the student may be allowed to enroll in courses late, and it is sometimes possible to have the fee waived.

### University Registration

Students go to Barton Hall for University registration at times announced by the Office of the University Registrar. At registration, students fill out and return materials that are given to them, and their IDs are validated.

After completing University registration, students proceed to the College of Human Ecology table in Barton Hall. At that table they hand in their college registration card and in return receive a computer printout of courses for which they are officially

enrolled. It is the student's responsibility to check the listing for accuracy of course numbers, credits, and other data. If there are errors, they should be corrected immediately. Procedures for making changes because of errors in the printout as well as for other reasons are described below.

During University registration for the fall semester, each continuing student receives a copy of his or her summary of record from the Office of the College Registrar. The summary shows which graduation and major requirements have been completed. Students who have any questions about the summary's accuracy should see a counselor in the Counseling Office or someone in the Office of the College Registrar.

**Late University registration.** A student who misses registration day must pay a \$30 penalty during the first three weeks. The late-registration fee is increased by \$10 each week for the fourth, fifth, and sixth weeks and \$25 for each additional week beyond. Late University registration is held during the first three weeks of the term. After the first week of classes, students must also have the written permission of the college registrar before they will be allowed to register in the University. After the third week of classes, students registering late must also have the permission of the Office of the University Registrar in addition to the written permission of the college registrar and pay the \$25 fee. After completing late University registration, students must take their college registration cards to the Office of the College Registrar, where they will then receive computer printouts of the courses for which they are officially registered. Students who fail to register by the seventh week of the term will be withdrawn from the University. Students who want to return must reapply through the Admissions Committee.

## Course Enrollment Changes

### Deadlines

- During the first three weeks of the term, courses may be added or dropped without charge.
- From the fourth through the seventh week of the term, course changes may be made with the permission of the instructor and payment of a \$10 processing fee.
- 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 the student's control (for example, illness). A student petitioning for medical reasons should provide substantiating medical evidence with the petition.
- 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.
- 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.

### Procedures

Students who need to make course enrollment changes should make them as soon as possible. It is to the student's advantage to add the desired courses as soon as possible, and it is helpful to other students if unwanted courses are dropped promptly.

Students should assess their work loads carefully at the beginning of each term. If in the first week or two the instructors do not discuss the amount of material to be covered and the extent of assignments, students are advised to ask about course requirements.

Some of the same procedures are required for course enrollment changes as were necessary for course enrollment—for example, permission of the instructor

must be obtained for a course requiring it, and the same forms for special studies courses must be filled out. In addition to the procedures listed below for course enrollment changes, all course change forms for nutritional sciences majors must be signed by the departmental faculty adviser.

Specific procedures for making course changes during the change-of-enrollment period (first three weeks of classes) are listed below. The student should:

- 1) Obtain an optical-mark course change form from the Office of the College Registrar or from the Counseling Office.
- 2) Fill the form out and take it to the appropriate office for signature: for human ecology courses, the forms should be taken to the Office of the College Registrar; for courses outside the college, the forms should be taken to the appropriate departmental offices.
- 3) Ask the person handling the class lists to add the student's name to the list of enrolled students for a course being added or to remove his or her name from the class list for a course being dropped. That person should sign the optical-mark course change form in the appropriate place.
- 4) Turn all signed forms in to the Office of the College Registrar, including the forms for out-of-college courses. Enrollment cannot be officially changed until the signed forms are filed in the registrar's office. For example, students who fail to "cancel" a course they are no longer attending are in danger of receiving an F in the course because they are still officially enrolled. There is no charge for course changes during the first three weeks of classes.
- 5) Receive carbon copies of each optical-mark course change form at the time it is turned in. These copies are stamped with the date of receipt. It is important to keep these copies in case they are needed to verify later that the forms were filed.

A student who wants to have his or her name placed on a waiting list for a human ecology course should be aware that such lists are compiled during the change-of-course-enrollment period on a first-come-first-served basis, without regard to seniority or other factors. Students must check their status on the waiting lists in person every forty-eight hours, and if space has not opened up, request that their names be kept on the list. Names are automatically dropped if they are not updated.

If a student is enrolled in a human ecology course with a limited enrollment and has not attended the first two class sessions, he or she will be dropped from the course unless circumstances have prevented him or her from attending class and the instructor has been notified.

After the third week and through the seventh week of the term, the procedures outlined above for changes made during the first three weeks of the semester are followed, except that the instructor must sign the course change form for human ecology courses and a \$10 fee must be paid.

After the seventh week of classes, a student may not make course changes without petitioning for approval. Students should realize that they are expected to attend classes and do assigned work until the petition has been formally approved.

## Study in Absentia

Under certain conditions, credit toward a Cornell degree may be given for study in absentia, that is, study done at an accredited institution away from Cornell after entering the College of Human Ecology. To be eligible for credit for such 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 return to good standing.

In absentia petition forms are available in the Counseling Office. The petition form should be filled out and catalog descriptions attached for the courses the student wants to take, and then it should be filed in the Office of the College Registrar.

Students whose petitions are granted receive a letter giving them permission from the college registrar to study in absentia. Credit may be granted for study in absentia after the work has been done, but there is no guarantee that such credit will be awarded if permission has not been obtained in advance.

A \$15 fee is charged to bind a student's 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 credits. A form is included with the letter sent to the student, giving permission to study. This form must be completed and returned to the Office of the College Registrar, 146 Martha Van Rensselaer Hall, along with a check for \$15, before the student is officially registered in absentia.

Up to 15 credits may be taken in absentia as long as the work done does not duplicate courses already taken and the study is relevant to the student's program and the requirements of the college. More than 15 credits of work 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) that goal is consistent with the focus of the college. To take more than 15 credits in absentia, a student must also have the petition approved by the director of special educational projects, who will evaluate the proposed program. (Forms are available in the Counseling Office.)

If part of the work for which credit is sought is to be applied to requirements of the major, the petition will be sent to the appropriate department for approval. If credit is sought for work to be done in a modern foreign language that the student has previously studied, the approval of the Department of Modern Languages and Linguistics in the College of Arts and Sciences must be obtained.

Students are responsible for having the registrar of the institution where they study in absentia send transcripts of grades to the Office of the College Registrar at the College of Human Ecology. Credit can then be officially assessed and applied toward the Cornell degree. Only credits (not course names and grades) for study in absentia 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

Students may request a leave of absence before the beginning of the semester for which a leave is desired or during the first seven weeks of the semester. A leave may be extended for a second semester by requesting an extension in writing from the Office of the College Registrar. Students who are contemplating taking a leave of absence are urged to discuss plans with a counselor. If the student decides to take a leave of absence, a counselor will provide the necessary forms to complete, which should be taken to the Office of the College Registrar, where the official leave will be processed.



Requests for leaves 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 the student is unable to complete the semester, such as extended illness.

If a leave of absence is requested after the first seven weeks, students are advised to attend classes until action is taken on their petitions. 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 to determine whether the student should return under warning, 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 and the Office of the College Registrar. Students contemplating such an action are urged to discuss their plans with a counselor.

There are instances in which a student may be given a withdrawal by the Office of the College Registrar. If a student leaves the college without an approved leave of absence or does not return after the leave has expired, the student will be given a withdrawal after the seventh week of the term in which he or she failed to register.

A student who has withdrawn from the college or who has been given a withdrawal by the Office of 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

There are two kinds of petition forms: the *General Petition Form*, which is multicopied, and the *In-Absentia Petition Form*, which is a single sheet and has no copies attached. Both types of forms are available from the Counseling Office, N-101 Martha Van Rensselaer Hall.

**The use of the General Petition Form** is described in the human ecology *Student Guide*. After completing the petition, the student should file the General Petition Form in N-101 Martha Van Rensselaer Hall. He or she will find out if the petition has been granted or denied by checking his or her mail folder in the foyer.

**The In-Absentia Petition Form** is used when the student wishes to study at another institution. (See the human ecology *Student Guide* for regulations concerning in-absentia study.) This form is also used for students who wish to take more than 15 credits in absentia during their college career. Catalog descriptions of the courses the student wishes to take at the other institution must be attached to the petition form. After completing the petition, the student should file the In-Absentia Petition Form in 146 Martha Van Rensselaer Hall. A letter in the mail will inform the student of the decision.

It should be noted that, although many kinds of requests are petitionable in the college, some kinds of situations are governed by college faculty

legislation and cannot be altered by filing a petition. If the student is in doubt about whether a request could be considered by petition, he or she may discuss the problem with the college registrar or the director of special education projects.

## 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 course description. 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 can 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 these courses to the Freshmen Seminar requirement.

To take a course for an S or U, a student must first make sure by checking the course description that the course is offered on that basis, then obtain the permission of the instructor and file a special S-U form with the instructor's signature and the add/drop/change form in the Office of the College Registrar 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 S-U grading status. Forms are available in the Office of the College Registrar and in the Counseling Office.

### Incompletes

A grade of INC (*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 reason should discuss the matter with the instructor and request an INC. A grade of *Incomplete* remains permanently on a student's official transcript even after the work is completed and a final grade recorded.

A student who receives an INC in a course may be permitted a maximum of two semesters and a summer in which to complete the work and receive a regular grade; if the work is not completed by that time, the INC remains on the record, and no credit is given for the course.

When a student wants to receive a grade of INC, a conference should be arranged 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. This form is submitted with the final grade sheets whenever an *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 the College Registrar with the grade sheet. Before a student will be allowed to register for succeeding semesters, he or she must go to the Office of the College Registrar to fill out and sign the remainder of the form.

If the work is satisfactorily completed within the required time, the course appears again on the student's official transcript, with 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 the College Registrar (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.

## 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 rank in the top 10 percent of their class for the semester. No student who has received an F or U in an academic course will be eligible.

**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 when they have attained junior status and if they 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 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.

## Nondepartmental Courses

### General Courses

**100 Critical Reading and Thinking** Fall, spring, or summer. 2 credits. Enrollment limited. S-U grades only.

Fall and spring: sec. T R 11:15 or 3:35, plus two 1-hour labs to be arranged. A. Grinols.

Modern research on reading and related perceptual processes is examined and applied with the goal of enhancing the student's evaluative ability in his or her reading and learning. Topics covered include thesis, bias, memory, analysis, and measurement. In addition, the course's interdisciplinary approach enables the student to maximize reading rate and multilevel comprehension in all academic areas.

**451-452 America and World Community (also Agriculture and Life Sciences 401-402 and Government 401-402)** 451, fall; 452, spring. 3 credits each term. May be repeated for credit.

M W 7:30 p.m. N. Awa, A. Eggleston, H. Feldman, R. Goldsen, E. Kenworthy, J. C. Mbata, R. McNeil, A. Srb, J. Ziegler, and others.

The aim of this interdisciplinary course is to explore the place of the United States in the world community. The course is based on the assumption that if the goal of human-kind is world community, so is the goal of education. And while there are countless urban and rural communities, there is only one world community, which needs to be studied in its ecological and geopolitical state in contrast to the normative or ideal state that it ought to become. This requires analysis by the humanities, social sciences, natural sciences, and religious studies.

### International Program

P. Frazer, director

The International Program both prepares students for international and intercultural education, and grants credit for foreign study at approved institutions. For information about study at cooperating foreign institutions, see the director of the program.

**360 Preparing for International or Intercultural Experience** Fall or spring. 2 credits. S-U grades optional. Prerequisites: two social science courses, or permission of instructor.

M 2:30-5. P. Frazer.

Introduces students to intercultural differences in preparation for work and study in developing nations and for work with subcultural groups in the United States. Topics will include cultural differences in motives, beliefs, and values; the transmission of culture; the relationship between culture and personality; perception; verbal and nonverbal communication; adjusting to a different culture; cultural contact and change; and human development programming in cross-cultural situations. Lectures, slides, films, and case studies provide the basis for class discussion on the many problems involved in intercultural relationships. Students receive 3 credits for the classroom component of this course; an additional 3-credit option is available if a January study tour is offered.

**361-362 Study Abroad** Fall and spring. 6-15 credits. Prerequisites: HE 360, satisfactory completion of any necessary foreign language requirement, a grade-point average of 2.5, and permission of academic adviser and assistant dean for undergraduate education. Deadline for receipt of applications in assistant dean's office: February 15 for following fall semester; October 1 for following

spring semester. Students register for their first semester of foreign study under 361, and for a second semester under 362.

A full-semester, off-campus program of courses, at least one of which includes field experience at a cooperating university in another country, designed to provide both theoretical background in factors relevant to the human ecology of the geographical area concerned and practical understanding of agencies and institutions concerned with human well-being in that environment. Presently the cooperating universities concerned are the University of Haifa, Israel, the University of Puerto Rico, and the University of the West Indies.

Students must plan their program well ahead of time with the help of their academic adviser, who must approve the plan before the application is submitted to the director of the International Program. An application for study abroad and list of courses at the foreign university approved for human ecology distribution requirements is available at 146 or 153 Martha Van Rensselaer Hall. Students should plan to take at least 12 credits, of which 6-9 should be credits approved for human ecology (Groups III or IV or both) and the balance used to continue language study or to satisfy distribution requirements for graduation or both.

Program supervision is undertaken by a specially designated faculty member of the foreign university. A transcript of credits earned is sent to the college registrar. Completion of course requirements is signified by a formal presentation to the college community upon return to Cornell.

### 380 Human Ecology: An International Perspective

Fall or spring. 3 credits. S-U grades optional. Prerequisite: one social science course or permission of instructor. Limited to 25 students.

W 7-9:45 p.m. B. Harding.

An exploration of a number of major issues contributing to an international perspective of human ecology. Topics to be considered will include hunger, politics, conflict, economics, the environment, and their influence on individual and family well-being. Case materials, readings, documentary films, and videotapes will form the basis for discussion.

### Division of Student Services

W. H. Gauger, assistant dean for student services  
B. Bricker, director of admissions  
J. McAllister, college registrar  
C. Reed, director of special educational projects  
L. Wiley, director of placement  
N. Yaghlian, director of counseling  
B. Morse, R. Richardson

Special studies sponsored by faculty members in the division involve such topics as counseling theory and practice in relation to various student populations, the career development process in fields related to human ecology, and the delivery of student services.

### 400-401-402 Special Studies for Undergraduates

Fall or spring. Credits to be arranged. S-U grades optional.

Hours to be arranged. Staff.

For independent study by an individual student in advanced work not otherwise provided in departments or for study on an experimental basis, with a group of students, in advanced work not otherwise provided in departments. Students prepare a multicopy description of the study they want to undertake, on forms available from the Counseling Office. This form must be signed by the student services faculty member directing the study, the office director, and the assistant dean for student services 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 assistant dean is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study.

### 400 Directed Readings

For study that predominantly involves library research and independent reading.

### 401 Empirical Research

For study that predominantly involves data collection analysis or laboratory or studio projects.

### 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.

### 600 Special Problems for Graduate Students

Fall or spring. Credit to be arranged. S-U grades optional. Limited to graduate students recommended by their chairperson and approved by the assistant dean for student services and the member of the staff in charge of the problem for independent advanced work.

Hours to be arranged. Staff.

## Interdepartmental Courses

### Field Study Office

T. Stanton, director; D. Giles, M. Holzer, M. Whitham

### 100 Orientation to Field Study: Skills for Learning in the Field

Fall or spring. 2 credits. Limited to 15 students per section. Prerequisites: permission of instructor. S-U grades optional.

14 sessions meeting through first 7 weeks of semester; T R 10:10-12:05 or T R 2:30-4:25.

D. Giles.

Workshops train students in skills that will help them become more effective field learners and better able to cope with the complex demands of a field placement. Topics include cross-cultural communication, participant observation, investigative interviewing, understanding nonverbal communication, identifying sources of information in the community, and analyzing verbal presentations. All of the concepts are applied to assignments in the field.

### 200 Preparation for Fieldwork: Perspectives in Human Ecology

Fall or spring. 4 credits. Limited to 25 students a section. Prerequisite: permission of instructor. For students interested in preparing themselves for field experience. Enrollment priority given to students of at least sophomore standing who intend to do field study the following semester.

T R 10:10-12:05 or T R 2:30-4:25. D. Giles.

Introduces students to field skills (such as interviewing, observation, public speaking, and leading discussion) and provides opportunities to practice and develop those skills. Additionally, small student task forces consider case studies highlighting complex issues at local, community, state, and national levels. Students work together to define problems, analyze and synthesize data from a variety of sources, and make group presentations.

### 400 Directed Readings

For study that predominantly involves library research and independent reading.

### 401 Empirical Research

For study that predominantly involves data collection and analysis.

### 402 Supervised Fieldwork

Fall, spring, or summer. 3-15 credits. S-U grades optional for up to 12 credits. Limited to 20 students. Prerequisite: ID 200. Enrollment by permission of instructor. Applications due in the Field Study Office during the preceding semester's course enrollment period.

Hours to be arranged. Staff.

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 theory and 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.

#### 403 Teaching Apprenticeship

For study that includes assisting faculty with instruction.

#### 406 Sponsored Field Learning or Internships

Fall, spring, or summer. 6–15 credits. S-U grades optional for up to 12 credits. Limited to 15 students; intended for juniors and seniors. Prerequisite: ID 200. Enrollment by permission of instructor. Applications are due in the Field Study Office during the preceding semester's course enrollment period.

Hours to be arranged. T. Stanton.  
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. Examples include New York State Assembly Internship Program, the Washington Center, and internships arranged independently by students with individual public or private organizations or institutions. Field supervision, largely carried out through biweekly correspondence, is aimed at complementing students' work-and-study assignments while on their internships and at enabling students to gain an in-depth understanding of how their internship organization operates and the internal and external ecological forces that influence it. 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.

#### 407 Field Experience in Community Problem Solving

Fall or spring. 6–15 credits. Limited to 25 students; intended for juniors or seniors. Prerequisite: ID 200. Enrollment by permission of instructor. Applications due in the Field Study Office during the preceding semester's course enrollment period.

Sem, R 1:30–4:25; hours in the field to be arranged. M. Whitham.

A course designed to provide students with a structured, closely supervised field experience encompassing an ecological approach to human problem solving. Interdepartmental teams of from two to five students will contract with community businesses, agencies, and organizations as special-projects staff members delegated primary responsibility for problem solving in a designated area of agency need. Students spend twenty hours each week working directly on the projects, 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 factors that affect the implementation of new programs, policies, or projects in upstate community settings. Set in this context, the field placement is viewed as a case study in the ecology of organizational decision making.

Supervision of all projects is provided jointly by the course instructor and appropriate agency personnel. In addition, each project is subject to review twice during the semester by an oversight committee composed of community and faculty representatives with relevant expertise. Completion of the course is signified by formal presentation of project results to the contracting organization's staff,

board of directors, or other appropriate administrative units, and members of the oversight committee, together with submission of an academic analysis of the implementation process to the course instructor.

Credit is variable to allow students to arrange for combined interdepartmental and departmental sponsorship and supervision.

Information on projects is available during course enrollment in the Field Study Office, 159 Martha Van Rensselaer Hall. Students may assist in the planning and project-identification process by making their interests known to the office a full semester before intended enrollment in the course.

#### 408 The Ecology of Urban Organizations: New York City

Fall or spring. 15 credits. Limited to 20 students; intended for juniors and seniors. Prerequisite: ID 200. Enrollment by permission of instructor. Applications due in the Field Study Office during the preceding semester's course enrollment period.

A full-semester, off-campus field course in New York City, designed to help students begin to understand how organizations function within an urban setting, while at the same time understanding the urban context and the people who live within it.

Students work 3½ days a week in field placements that can represent every sector of the urban environment, from large corporations and government agencies to small businesses and grassroots community groups. Placements focus on different kinds of skills: providing information, planning and making policy, providing services to clients and customers, and designing apparel or living-work environments. Students should focus on selecting the kind of skill that interests them when entering the 408 placement process. A full-day seminar each week is designed to include support sessions, organizational analysis exercises, simulations, guest speakers, and field trips to various parts of New York. Regular reflection on the work experience is required through papers and meetings with site supervisor and field instructor. As a unifying theme, students participate in small group presentations covering current issues in New York. Recent topics have been the New York City fiscal crisis, the energy crisis, Reaganomics, and women and work.

Students may enroll in ID 408 for 9 to 15 ID and 0 to 6 departmental credits, depending on departmental regulations. Information on these policies and on ID 408 placements is available in 159 Martha Van Rensselaer Hall. Students should begin planning at least one full semester before they apply to ID 408.

#### 409 The Ecology of Organizations in the Upstate Region

Fall or spring. 3–15 credits. Limited to 25 students. Prerequisite: ID 200. Enrollment by permission of instructor. Applications are due in the Field Study Office during the preceding semester's course enrollment period.

Sem, T 1:30–4:25. Hours in the field to be arranged. M. Whitham.

A variable-credit, Ithaca-area 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 that provides the skills, concepts, and theories necessary for understanding organizations and the critical issues they face. Credit is variable to allow students to arrange for combined interdepartmental and departmental sponsorship and supervision.

Information on placement opportunities is available in the Field Study Office, 159 Van Rensselaer Hall. Students should begin planning at least a semester in advance for field study. Applications are due in the Field Study Office during preregistration of the term prior to field placement.

## Toxicology

#### 699 Special Topics In Toxicology (also Toxicology 699)

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 Institute for Cooperative and Environmental Toxicology, N202 Martha Van Rensselaer Hall (telephone: 256-8112).

## Consumer Economics and Housing Courses

J. Robinson, chairman; A. Davey, graduate faculty representative; R. Heck, undergraduate advising coordinator for CEH; W. K. Bryant, undergraduate advising coordinator for public policy option; H. B. Biesdorf, P. Chi, S. Clemhout, W. H. Gauger, J. Gerner, B. Hall, M. Lea, J. Hogarth, E. S. Maynes, P. Pollak, N. C. Saltford, A. Shlay, J. Swanson, S. White-Means, P. Zorn

#### 110 Introduction to Consumer Economics I

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. P. Zorn.  
Principles of microeconomics with an emphasis on applications to consumers, household economics, and housing. Introduction to the concepts of opportunity cost, time as a resource, consumer demand, production, market failure, and the impact of government regulation of the market on consumers.

#### 111 Introduction to Consumer Economics II

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. J. Robinson.  
This course introduces students to the issues and concepts in macroeconomics. The goal of the course is to give students a working knowledge of economic terms, issues, and theories so that they can understand issues as presented in the popular press. Topics covered include national income accounting, Keynesian versus monetarist theories of income determination, the workings of financial markets and institutions, income distribution, and the role of monetary and fiscal policy in dealing with the problems of inflation and unemployment.

#### 148 Sociological Perspectives on Housing

Spring. 3 credits. Enrollment limited to 6 sections of 20 students each. S-U grades optional.

Lecs, T R 10:10; secs, M 9:05 or 2:30, (2) T 11:15, W 10:10 or 2:30. A. Shlay.

An introductory sociology course analyzing the distribution of housing and population within urban areas. Students focus on the link this urban social and spatial structure has to the quality of urban life. Topics include urban ecology, mobility and migration patterns, suburbanization, segregation, urban social stratification, community power, crime, and poverty.

#### 233 Marketing and the Consumer

Spring. 3 credits. Prerequisite: CEH 110 or equivalent. S-U grades optional.

T R 8:30–9:55. E. S. Maynes.  
A study of marketing functions, institutions, policies, and practices, with emphasis on how they create consumer satisfaction. (N. Saltford may direct an optional marketing project with a nearby consumer products firm under the designation of CEH 401; 2 credits; W 7–9 p.m. Permission of instructor is required for participation in the project.)

**247 Housing and Society** Fall. 3 credits. S-U grades optional.

M W F 11:15. 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.

**300 Special Studies for Undergraduates** Fall and 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 forms available from the Counseling 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.

**312 Family Resource Management** Fall and spring. 3 credits. S-U grades optional. Limited to 35 students; not open to freshmen; preference given to human ecology juniors, seniors, and transfer students.

T R 2:30–4. A. Davey.

A systems approach identifies and analyzes components of family management. The focus is on the contribution of management to the improvement in family living. The Personalized System of Instruction format permits self-pacing.

**315 Personal Financial Management** Fall and spring. 3 credits. Limited to 200 students. Preference given to human ecology students; not open to freshmen. S-U grades optional.

Fall: M W F 1:25. J. Robinson. Spring: M W F 10:10. R. Heck.

The study of personal financial management at various income levels and during different stages of the family life cycle. Topics include the use of budgets and record keeping in achieving family economic goals, the role of credit and the need for financial counseling, economic risks and available protection, and alternative forms of saving and investment.

**325 Economic Organization of the Household** Spring. 3 credits. Prerequisite: CEH 110 or equivalent. S-U grades optional.

M W F 9:05. J. Gerner.

Theories and empirical evidence of how households spend their resources are used to investigate the ways households alter the amounts and proportions of time and money spent in various activities, their size, and their form in response to changing economic forces.

**332 Consumer Decision Making** Spring. 3 credits. Prerequisite: CEH 110 or permission of instructor.

T R 10:10–11:25. E. S. Maynes.

This course is designed to help students make more effective choices as consumers through an understanding of the economy and the use of relevant economic and statistical principles. The course is normative, stressing how consumers should act in order to achieve their goals.

**341 Fundamentals of Housing Economics** Spring. 3 credits. Prerequisites: CEH 110–111 or equivalent. S-U grades optional.

T R 8:30–9:55. P. Zorn.

This course discusses the microeconomics of housing markets, with emphasis on the factors affecting the demand and supply of housing. It will focus on the role of housing within an urban economy. Topics include income taxes and housing, tenure choice, house depreciation, elasticity estimation, house-price determination, and models of urban housing market dynamics. The course seeks a blend of economic theory and empirical studies of housing economics.

**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 one to two credits under CEH 600. Prerequisites: CEH 110–111 or equivalent. S-U grades optional.

M W F 9:05. W. K. Bryant.

Examination of contemporary economic problems that affect the welfare of families in the United States. Examples are affluence and poverty; monetary and fiscal policies as these affect families; and efficacy of the delivery of public services in the areas of health, education, and subsidized housing. Where relevant, the historical origin of these problems will be studied.

**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 forms available from the Counseling Office. This form must be signed by the instructor directing the study and the department chairman 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 chairman is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study:

**400 Directed Reading**

For study that predominantly involves library research and independent reading.

**401 Empirical Research**

For study that predominantly involves data collection and analysis or laboratory or studio projects.

**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.

**411 Time as a Human Resource** Fall. 3 credits. Prerequisites: one course in sociology. Recommended: one course in microeconomics. S-U grades optional.

T R 10:10–11:25. R. Heck.

A seminar based on historical and contemporary readings. Examines and explores time management concepts and applications. Investigates changes in time use of family members in relation to social change. Explores meanings of market work, household work, and leisure in the context of family choices at different stages of the life cycle. Investigates current research concerning time allocations made by family members to household and market work. Examines use of time as a measure of household activities and production.

**[413 An Ecological Approach to Family Decision Making]** Spring. 3 credits. S-U grades optional.

Limited to 20 students; not open to freshmen; preference given to juniors and seniors. Recommended: CEH 312 or equivalent. Offered alternate years. Not offered 1983–84; next offered 1984–85.

T R 10:10–11:25. A. Davey.

Family decision making is studied from an ecosystem perspective. Special attention is given to how such decisions may affect the quality of family life as well as the larger society.]

**430 The Economics of Consumer Policy** Spring. 3 credits. Prerequisites: CEH 110–111 or permission of instructor.

M W F 1:25. S. White-Means.

Students are acquainted with the basic approaches to consumer policy and perform economic analyses

of specific consumer policy issues. Consumer sovereignty, the consumer interest, and consumer representation are all dealt with, along with economic analyses of current and enduring consumer policy proposals and programs.

**431 Consumer Behavior** Fall. 3 credits. Open to seniors and graduate students. Prerequisite: CEH 110 or equivalent.

T 12:20–2:15, R 12:20–1:10 (graduate students);

R 1:25–2:15 (undergraduates). E. S. Maynes.

This course applies the concepts, models, and research techniques of the behavioral sciences to the explanation and prediction of consumer behavior. The student is exposed to representative theories, models, problems, and research techniques. Special efforts are made to insure that students encounter problems approached from both seller and consumer viewpoints as well as from the disciplines of economics and social psychology. Once a week graduate students and undergraduates meet in separate sessions to review and appraise representative pieces of consumer behavior research.

**441 Housing, Consumer Credit, and Real Estate Finance** Spring. 3 credits. Prerequisites: CEH 110–111. S-U grades optional. Offered alternate years.

T R 10:10–11:25. R. Heck.

Examines the residential and consumer credit-financing process, alternative credit instruments, and sources of credit. The differences between instruments and their effects on consumer decision making will be studied. The role of credit in the economy and the influence of government policy on the supply of credit will also be discussed.

**443 Social Aspects of Housing and Neighborhood**

Fall. 3 credits. Prerequisite: CEH 247 or 148. S-U grades optional.

T R 10:10–11:25. A. Shlay.

The relationship between housing and social behavior and organization is examined. Levels of analysis include the physical features of housing that influence human behavior and the quality of life; the housing composition of neighborhoods, the congruency between local housing and population composition, patterns of interaction, and the physical dimensions of community; housing as an expression of the chronology of family life; and housing as a bundle of property rights that confer or deny political rights, local stature, and citizenship and provide more or less control over one's life.

**[444 Housing for the Elderly]** Spring. 3 credits.

S-U grades optional. Prerequisite: CEH 247 or permission of instructor. Offered alternate years. Not offered 1983–84; next offered 1984–85.

T R 2:30–3:45. 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 elderly housing environment. Attention is also given to government housing programs for the elderly, integrating housing and related social service activities, and options for alternative housing.]

**448 Housing and Local Government** Spring. 3 credits. Prerequisite: CEH 110 or equivalent. S-U grades optional. Offered alternate years.

T R 2:30–3:45. P. Zorn.

Analysis of state and local government tax, expenditure, and regulatory activities that affect the housing market. Detailed consideration will be given to property taxation, provision of local public goods, zoning, housing and building codes, and other governmental policies that deal with housing and neighborhood environment.

**449 Housing Policy and Housing Programs** Fall. 3 credits. Prerequisites: CEH 111 or equivalent. S-U grades optional.

T R 2:30–3:45. M. Lea.

This course critically examines the rationales, development, and economic effects of a wide variety of housing-related programs. The use of housing programs as a tool of income redistribution, the role of government in correcting market imperfections in the production and finance of housing, and the role of the housing sector in macroeconomic stabilization will be discussed. Special attention will be given to the differences and interactions between rental and owner-occupied housing. Other topics include public housing, cash-based housing programs, tax treatment of housing, the problems of the thrift industry, and the government role in the secondary-mortgage market.

**450 Economics of Health, Health-Care Expenditures, and Health Policy** Fall. 3 credits. Prerequisite: CEH 110 or equivalent.

T R 2:30–3:45. S. White-Means.  
A study of the health-care market as distinguished from other markets because of the relative information disadvantage on the part of the consumer. Topics include a theoretical and institutional analysis of the health-care system and its role in the consumer decision-making process, conflicts of interest between institutional objectives of health-care providers and public and private health-care insurers as they relate to inefficient provision of medical services, and the role of government intervention and alternative systems of medical care provision in reducing medical costs and in increasing assessability.

**465 Consumers and the Law** Fall. 3 credits. Prerequisite: CEH 111 or equivalent. S-U grades optional.

M W F 1:25. W. K. Bryant and J. Gerner.  
The operations of federal agencies and the courts in various consumer areas, including compensation for injury from defective products, deceptive advertising, the Fairness Doctrine in television and radio broadcasting, the regulation of food and pharmaceutical drugs, class actions, fraud, and the proposed consumer protection agency.

**472 Community Decision Making** Fall. 3 credits. Prerequisite: Government 111 or equivalent. S-U grades optional.

T R 8:30–9:55. A. Hahn.  
Identification and discussion of factors that influence the outcomes 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.

**[480 Welfare Economics]** Fall. 3 or 4 credits. Prerequisite: permission of instructor before advance course enrollment. S-U grades optional. Not offered 1983–84.

M W F 9:05. S. Clemhout.  
A study of the social desirability of alternative allocation of resources. Topics include Pareto Optimality, external effects on production and consumption with applications to problems of environmental quality, public expenditure decisions, measurement of welfare, and evaluation of relevant public policy issues.]

**485 Economic Analysis of Public Decision Making** Fall. 3 credits. Prerequisite: an intermediate microeconomic theory course or equivalent. Offered alternate years.

T R 10:10–11:25. M. Lea.  
This course examines various theories about the growth in the public sector and introduces the student to the tools of cost benefit analysis as a device for evaluating the effectiveness of government programs. The first half of the course examines the rationales for government intervention and the mechanisms (both legislative and bureaucratic) by which the rationales are translated into government programs. The second half of the course concentrates on the evaluation of government programs through cost benefit analysis. Discussion of

the issues and problems of cost benefit analysis is augmented with examples of its use in a variety of areas, including physical investment projects, housing programs, and government regulations.

**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 chairperson and approved by the head of the department and the instructor.

**601 Seminar in Consumer Economics and Housing** Fall and spring. 1–3 credits. S-U grades only.

Hours to be arranged. 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.

**612 History and Development of Home-Family Management** Fall. 3 credits. Prerequisites: graduate standing and some background in home or family management. Recommended: a course in family sociology. Offered alternate years.

T R 8:30–9:55. A. Davey.  
History and development of home-family management as an area of study. Conceptual frameworks currently in use are analyzed and critiqued.

**614 Readings in Family Decision Making** Fall and spring. 2–3 credits. Recommended: a course in family sociology. S-U grades optional.

Hours to be arranged. A. Davey.  
Family decision making is studied from the perspective of decision processes, behavior of decision makers, and decision context. The relationship of decision making to family management is also explored.

**[615 Family Financial Management]** Spring. 3 credits. Prerequisites: introductory statistics course and CEH 315 or equivalent. S-U grades optional. Offered alternate years. Not offered 1983–84; next offered 1984–85.

W 2–4:25. R. Heck.  
The study of management theory applied to the financial dimension of the household. 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 field are included.]

**[621 Explorations in Consumer Economics]** Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. Not offered 1983–84.

Hours to be arranged. Staff.  
With the guidance of the instructor, students select and investigate independently a substantive current consumer issue. The topic selected must be one that can be studied within both an economic and an institutional framework. Students present status reports to the class regularly for criticism and feedback. A term paper is required.]

**626 Economics of Household Behavior I** Spring 3 credits. Prerequisite: Economics 311 or concurrent enrollment in Economics 311. S-U grades optional.

M W F 10:10. W. K. Bryant and J. Gerner.  
Introduction at graduate level to theory and empirical research on household demand, consumption, savings, and market work, with implications for current policy issues. Provides introduction to more advanced treatment of market work, household production, and economics of the family presented in CEH 627.

**627 Economics of Household Behavior II** Fall 3 credits. S-U grades optional. Prerequisites: Economics 311 and CEH 626.

M W F 10:10. W. K. Bryant and J. Gerner.

Further examination of theoretical and empirical literature concerning market work, household production, and family formation as well as policies in these areas. Based on introduction provided in CEH 626.

**628 Information and Regulation** Spring. 3 credits. Prerequisites: CEH 626 or 627.

M W 8:30–9:55. S. White-Means.  
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. Anti-trust 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.

**640 Fundamentals of Housing** Fall. 3 credits. Prerequisite: graduate standing or permission of instructor. S-U grades optional.

M W 2:30–3:45. P. Chi.  
An introductory 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.

**[642 Housing and Local Government: A Microperspective]** Spring. 3 credits. Prerequisite: Economics 311 or equivalent. S-U grades optional. Offered alternate years. Not offered 1983–84; next offered 1984–85.

T 2:30–5. P. Zorn.  
An examination of housing issues from a microeconomic perspective. The course first establishes a context for the study of housing by briefly exploring economic theories of the structure of urban environments. The supply, demand, and market equilibrium of housing is then considered along with special topics on rent control, filtering, and discrimination. The local government perspective is introduced by considering the issues of zoning and land-use controls, suburbanization-sprawl, and property taxation.]

**644 Housing Finance and Market Analysis: A Macroperspective** Spring. 3 credits. Prerequisites: Intermediate micro- and macroeconomics, one course in statistics. Recommended but not required: CEH 441. Offered alternate years.

T R 3:35–5. M. Lea.  
This course analyzes housing markets and housing policies from the macroeconomic and financial perspectives, focusing on metropolitan, regional, and national aspects of housing demand and supply. The first half of the course develops a macroeconomic framework for analyzing housing by discussing the role of housing in the economy, determinants of overall home-ownership rates, aggregate housing demand and production, and housing forecasts. The second half of the course focuses on the housing finance system, including the effect of both credit availability and the structure of different mortgage instruments on housing demand, the problems and current attempts to reform the thrift industry, and the development and economic effects of the secondary-mortgage market.

**648 Household and Family Demography** Spring 3 credits. Prerequisite: graduate standing or permission of instructor. S-U grades optional. Offered alternate years.

M W 2:30–3:45. P. Chi.  
This course is concerned with the size and composition of households and families; their variation among nations and between subgroups within the nation; changes over time, including both secular trends and change over life cycle; the determinants of change and variation; and socioeconomic consequences of household variation.



and change, such as influences on residential mobility and housing adjustments, impacts of family structure on fertility, implications of family composition for female labor-force participation, and effects of household and family structure on economic behavior.

**[665 Seminar on Consumer Law Problems]**

Spring. 3 credits. Open to CEH graduate students and to others with permission of instructor. Enrollment limited to 20 students. S-U grades optional. Not offered 1983-84.

T 10:10-12:05. Staff.

A study of areas of current interest to consumers involving the law as developed by regulatory commissions and the courts, with emphasis on the institutional and economic background. Encourages critical examination of policy issues and their social and economic effects on families.]

**[670 Community, Housing, and Local Political Processes]**

Spring. 3 credits. S-U grades optional.

Offered alternate years.

T 1:25-4:25. A. Shlay.

Seminar directed at establishing linkages between the organization of space, political power, and social welfare. Part one examines theoretical and empirical perspectives on power, community power, models of residential differentiation, and political outcomes. Part two examines the politics of metropolitan organization and the linkages between spatial form, social reproduction, and social control. Part three works toward defining the parameters whereby community (spatially proximate people) is or can become a viable arena for social change.

**[671 Power, Participation, and Public Policy]**

Spring. 3 credits. S-U grades optional. Offered alternate years. Not offered 1983-84; next offered 1984-85.

T 1:25-4:25. A. Shlay.

Explores the sources of American political stability by concentrating on the ways in which political power and participation are managed within the public-policy arena. The first part of the course focuses on competing theories of political stability and legitimacy. The second part focuses on political processes and modes of political action. The third part examines power structuring, focusing on the empirical work that looks at the link between the activity of power wielding and class structure.]

**[680 Applied Welfare Economics—Policy Issues]**

Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. Not offered 1983-84.

M W F 9:05. S. Clemhout.

Topics vary from year to year. The objective of the course is to evaluate the economic impact of various policies in conjunction with the efficiency of existing institutions. Policy issues covered include education (effects of automation and so forth), health, and environmental problems (urban development or transportation, for example). Attention is given to the interrelationship of policy and planning within the larger economic and sociopolitical framework.]

**[697 Seminar]**

Fall and spring. No credit.

M 3:30-5. Staff.

Planned to orient students to graduate work in the field, to keep students and faculty abreast of new developments and research findings, to acquaint them with topics in related areas, and to examine and discuss problems of the field.

**[726 Consumption and Demand Analysis]**

Spring. 3 credits. Prerequisite: intermediate economics theory or permission of instructor. S-U grades optional. Offered alternate years.

M W 1:25-3:20. W. K. Bryant.

Major developments in the theory of household behavior with applications to consumption, saving, physical asset, debt, and liquid-asset positions of households; demand and expenditure analyses.

**[727 Human Capital]** Fall. 3 credits. Prerequisite: intermediate economic theory or permission of instructor. Recommended but not required: CEH 411. S-U grades optional. Offered alternate years. Not offered 1983-84; next offered 1984-85.

Hours to be arranged. J. Gerner.

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 nonhousehold activities and how these activities are influenced by outside economic forces and by internal family characteristics.]

**[740 Seminar in Current Housing Issues]** Spring. 1-3 credits. Prerequisite: permission of instructor. S-U grades optional. Not offered 1983-84.

Hours to be arranged.

Focuses on a selected group of national issues related to housing. The issues evaluated vary from year to year, based on current importance and student interest. When possible, this course presents present or recent research, with emphases on both content and methodology.]

**[899 Master's Thesis and Research]**

Fall or spring. Prerequisite: permission of the chairperson of graduate committee and instructor. S-U grades optional.

Graduate faculty.

**[999 Doctoral Thesis and Research]**

Fall or spring. Prerequisite: permission of the chairperson of graduate committee and instructor. S-U grades optional.

Graduate staff.

## Design and Environmental Analysis Courses

W. R. Sims, Jr., chairman; S. K. Obendorf, graduate faculty representative; A. Racine, undergraduate advising coordinator; G. Atkin, F. D. Becker, M. Boyd, A. Bushnell, C. C. Chu, P. Eshelman, C. E. Garner, A. T. Lemley, W. J. McLean, L. Mankowski, G. C. Millican, E. R. Ostrander, M. E. Purchase, R. Rector, P. Schwartz, G. Sloan, C. Straight, S. S. Watkins, M. W. White, S. Worth, B. Ziegert

**[101 Design I: Fundamentals]**

Fall or spring. 3 credits. Each section limited to 20 students. Priority given to DEA majors. Approximate cost of materials, \$60.

M W 1:25-4:25, or T R 10:10-1:10 or

1:25-4:25. M. Boyd, C. Straight.

A studio course introducing the fundamental vocabulary and principles of design. Students experiment with the development of form through problem-solving approaches.

**[102 Design II: Fundamentals]**

Spring. 3 credits. Each section limited to 20 students. Prerequisite: DEA 101. Approximate cost of materials, \$50.

M W 1:25-4:25 or T R 8-11. M. Boyd, A. Bushnell, C. Straight.

A study of visual organization, including problems of color and visual perception. Emphasizes the development of visual sensitivity, imagination, and problem structuring, utilizing simple materials to produce abstract solutions.

**[111 Theory of Design]**

Spring. 3 credits. Enrollment limited to 120 students; DEA majors given priority.

M W F 11:15. Staff.

Introduction to the field of design for the student 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 requirements in the man-made environment as affected by the interaction of people, design, and

materials. Lectures and visual material are presented by DEA faculty members and visiting design professionals.

**[115 Drawing]**

Fall or spring. 3 credits. Each section limited to 25 students. Priority given to DEA majors. Minimum cost of materials, \$50.

M W 1:25-4:25 or 7:30-10:30 p.m., or T R 1:25-4:25. Staff.

A studio drawing course. Discussion groups on the idea and techniques of drawing are held to develop a visual understanding and vocabulary. The student is introduced to the functions of line, shape, and value. Drawing from the figure and from inanimate objects, perspective, and conceptual drawing are emphasized.

**[117 Drawing the Clothed Figure]**

Spring. 3 credits. Enrollment limited to 25 students. Prerequisites: DEA 115 or equivalent. Priority given to DEA Option 2 and 3 majors. S-U grades optional. Approximate cost of textbook, \$25; supplies, \$35.

M W 8-11. C. Garner.

Intended 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 communication of design ideas.

**[120 Elements of House Design: Technology]**

Spring. 3 credits.

Lecs, T R 10:10-11:30; lab, T or R 10:10-12.

L. Mankowski.

An introduction to the residential design process. A thorough analysis of the construction techniques and mechanical systems of human habitation. Topics include a historical overview of shelter and architectural styles of the 1900s, site selection and analysis, building materials, structural design, water and waste systems, electrical lighting systems, energy conservation techniques, and contemporary passive solar-energy systems. The course ends with a minor design problem intended to integrate technology and the design process.

**[135 Textiles I]**

Fall. 3 credits. Each lab limited to 20 students. Prerequisite or corequisite: Chemistry 103 or 207. Maximum cost of supplies and textbook, \$30.

Lecs, M W 10:10; lab, T or W 2:30-4:25. Staff.

An introduction to the basic properties of textile materials, with consideration of their technology, consumer uses, and economic importance. Behavior of textile materials is observed in a variety of environmental conditions that influence aesthetics, comfort, and performance. This course is designed to provide a basis for further study in textiles, but it also contains sufficiently broad coverage of the subject to be used as an elective course.

**[145 Apparel Design I]**

Fall or spring. 4 credits. Prerequisite: basic sewing skills. Those with formal course work in pattern design may take an exemption exam by contacting instructor the first day of registration. Minimum cost of materials, \$60; lab fee, \$5.

Fall: lec and labs, T R 1:25-4:25. Spring: lec and labs, M W 7:30-10:30 p.m. A. Racine.

Intensive study of principles and processes of flat pattern design and fitting techniques with emphasis on development of creative expression.

**[150 Introduction to Human-Environment Relations]**

Fall. 3 credits. Required for DEA majors.

M W F 12:20-1:10. F. Becker, E. Ostrander, B. Sims, G. Sloan.

An introduction to the influence of the physical environment on human behavior. Topics include environmental influences on social behaviors such as crowding, sense of community, crime, and friendship; environmental needs associated with social characteristics such as different stages in life cycle, life styles, social class, family structures, and handicaps; basic consideration in person-environment fit such as lighting, acoustics, and thermal comfort; an introduction to human factors and

systems analysis; the effects of environmental form on perception and cognition; the dynamics of collaboration; user-responsive design; the participatory design process; research in programming; and postoccupancy evaluation.

**201 Design III: Basic Interior Design** Fall 5 credits. Each section limited to 18 students. Prerequisites: DEA 101, 102, and a 3-credit drawing course (DEA 115 strongly recommended). Coregistration in DEA 203 is required. Recommended: DEA 111 and 150. Minimum cost of materials, \$120; shop fee, \$10; optional field trip, approximately \$60.

M 2:30–4:25 and T W R 1:25–4:25. A. Bushnell, P. Eshelman, N. Markovich.  
Beginning interior design studio. Focus is on development of basic proficiency in design skills. The course is structured around a series of elementary interior and interior-product design problems of 3 to 5 weeks in length.

**202 Design IV: Basic Interior Design** Spring 5 credits. Each section limited to 18 students. Prerequisites: DEA 201, 203. Prerequisite or corequisite: DEA 111, 150, and 204. Minimum cost of materials, \$120; darkroom fee, \$10.

M 2:30–4:25 and T W R 1:25–4:25. A. Bushnell, P. Eshelman, N. Markovich.  
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.

**203 Design Communications** Fall. 1 credit. Enrollment limited to 25 students. Priority given to DEA Option 1 majors.

M 1:25. P. Eshelman.  
Communication techniques for interior designers. Focus is on a selected set of presentational techniques useful to designers in understanding and developing design proposals during the design process, and on communicating interior design proposals to clients and users. Plans, sections, perspectives, isometrics, rendering techniques, models and model photography, and techniques for presentations of design proposals to audiences will be covered.

**204 Introduction to Building Technology** Spring. 1 credit.

M 1:25. L. Mankowski.  
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.

**230 Science for Consumers** Fall. 3 credits. Limited to 20 students. Prerequisite: high school or college chemistry or physics. S-U grades optional. Offered alternate years.

Lecs, T R 9:05; lab, W 12:20–2:15.  
Principles of science related to consumer problems such as energy conservation in the home, electricity in dwellings, heat transfer, control of temperature, humidity, sound and odors in dwellings, mechanics of equipment, chemistry of cleaning agents, and chemical characteristics of surfaces to be cleaned. Particularly valuable for environmental designers and analysts and students planning to work with consumers as teachers, extension workers, home-service personnel, or consultants.

**232 Science, Technology, and Human Needs** Spring. 3 credits. Prerequisite: high school chemistry or physics. S-U grades optional.

M W F 10:10. A. T. Lemley.  
An examination of some underlying scientific principles of today's complex technology. Designed to enable students to identify, understand, and better evaluate current problems that have a basis in the physical sciences and are of concern to society. Some areas to be covered: air and water quality; communications; energy; and toxic wastes-risks and regulations. Course relates principles of the natural sciences to specific applications that affect people and their environment.

**235 Textiles II** Spring. 4 credits. Each lab limited to 16 students. Prerequisites: DEA 135 and 1 semester of chemistry. Recommended: 2 semesters of chemistry.

Lecs, T R 9:05; labs, T R 10:10–12:05 or T R 2:30–4:25. P. Schwartz.  
A study of critical performance characteristics of textiles and the relation of these characteristics to use of textile articles. Emphasis is on comfort, durability, and special performance characteristics. Also included is study of the purposes, scope, and limitations of laboratory textile testing and the relations between laboratory testing and end-use performance.

**240 Clothing through the Life Cycle** Spring 3 credits. Open to freshmen, sophomores, and DEA transfers; others with permission of the instructor.

T R 10:10–11:30. S. Watkins.  
An introduction to clothing as it affects the physical and psychological well-being of the individual. Emphasis is on the functional aspects of clothing for individuals from infancy through old age and for groups such as the handicapped or those in special occupations. Students explore the resources available to the designer for solving clothing problems.

**242 Apparel Industry: Field Experience** January intercession or spring-term break. 1 credit. Approximate cost, \$250 to \$300.

B. Ziegert.  
A one-week field experience in a major apparel center. Students are responsible for field-trip expenses. Students will have the opportunity to observe design firms, manufacturers, retailers, promotion and media establishments, and museums in the multifaceted apparel and textile industry.

**245 Dress: A Reflection of American Women's Roles** Fall. 3 credits. Enrollment limited to 40 students. S-U grades optional. Because the class meets only once a week, attendance at each session, especially the first, is extremely important.

M 7:30–10:30 p.m. A. Racine.  
A historical survey of changing patterns of American women's dress from the colonial period to present day, as well as the sociocultural forces that affected women's development within the social class structure. The Cornell Costume Collection and illustrated lectures are used to develop an awareness of historic costume, while assigned readings focus on expected roles. Students investigate topics dealing with the impact of dress on cultural assimilation of immigrant women in America.

**250 The Environment and Social Behavior** Fall. 3 credits. Prerequisite: DEA 150 or permission of instructor.

M W 10:10–12:05. F. Becker.  
A combination seminar and lecture course for students interested in the social sciences or design. Using a series of exercises, students examine and apply the ways environmental form influences social behaviors such as aggression, cooperation, community, and crime, and how characteristics such as stage in life cycle, family structure, and social class influence environmental needs and purposes. The implications for the planning, design, and

management of complex environments such as offices, hospitals, schools, and housing are emphasized.

**251 Historic Design I: Furniture and Interior Design** Fall. 3 credits. Prerequisites: DEA 101 and 111. Recommended sequence: DEA 251, 252, and 353.

M W F 11:15. G. C. Millican.  
A study of the patterns of historical development and change in architecture, furniture, and interiors from man's earliest expressions to the present as they reflect the changing cultural framework of Western civilization, excluding America.

**252 Historic Design II: Furniture and Interior Design** Spring. 3 credits. Prerequisite: DEA 101. Corequisite: DEA 111. Recommended sequence: DEA 251, 252, and 353.

M W F 8. G. C. Millican.  
A study of the patterns of historical development and change as revealed through American 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.

**261 Fundamentals of Interior Design** Fall 3 credits. Enrollment limited to 20 students. Prerequisite: DEA 101. Minimum cost of materials, \$30.

T R 1:25–4:25. G. C. Millican.  
A studio course that emphasizes the fundamental principles of design applied to the planning of residential interiors and coordinated with family and individual needs. Studio problems explore choices of materials, space planning, selection and arrangement of furniture, lighting, and color. Illustrated lectures, readings, and introductory drafting and rendering techniques are presented.

**264 Apparel Design II** Fall. 4 credits. Prerequisites: DEA 145 and completion of, or concurrent registration in, DEA 101 and 135, or permission of instructor. Recommended: DEA 115 and 240. Apparel design majors should take DEA 264 and 367 in the same academic year. Minimum cost of materials, \$60; lab fee, \$5.

T R 1:25–4:25. B. Ziegert.  
A studio course interrelating two techniques for designing apparel: draping and advanced flat pattern. Problems require the student to make judgments regarding the design process, nature of the materials, body structure, and function.

**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 forms available from the Counseling 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.

**301 Design V: Intermediate Interior Design** Fall. 5 credits. Prerequisites: DEA 111, 150, 201, 202, 203, 204. Corequisite: DEA 303. Recommended: DEA 459. Minimum cost of materials, \$120; shop fee, \$10; optional field trip, approximately \$60.

M 2:30–4:25 and T W R 1:25–4:25. A. Bushnell, N. Markovich.  
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.

**302 Design VI: Intermediate Interior Design**

Spring. 5 credits. Prerequisites: DEA 301, 303. Corequisite: DEA 304. Minimum cost of materials, \$120; shop fee, \$10.

M 2:30–4:25 and T W R 1:25–4:25. A. Bushnell, N. Markovich.

Second-semester, intermediate-level interior design studio. Continued emphasis on development of design skills and an exposure to generic problem types.

**303 Introduction to Furnishings, Materials, and Finishes**

Fall. 1 credit.

M 1:25. N. Markovich.

Basic understanding of furniture types and systems; interior products and equipment such as workstations; 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.

**304 Introduction to Professional Practice of Interior Design**

Spring. 1 credit.

M 1:25. N. Markovich.

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, legal responsibilities and concerns, contracts, basic contract documents such as working drawings and specifications, supervision of construction and installation, and cost estimation.

**325 Human Factors: Ergonomics-Anthropometrics**

Fall. 3 credits. Recommended: DEA 150.

T R 10:10–11:30. G. Sloan.

Implications of human physical and physiological characteristics and limitations on the design of settings, products, and tasks. An introduction to engineering anthropometry, biomechanics, work physiology, and motor performance. Attention is given to the needs of special populations such as the physically handicapped.

**[330 Household Equipment Principles**

Fall. 3 credits. Prerequisites: Nutritional Sciences 146 or DEA 135 or 230. S-U grades optional. Offered alternate years. Not offered 1983–84; next offered 1984–85.

M W 2:30–4:25. M. Purchase.

Principles of operation of appliances for food preparation and preservation, cleaning, laundering, temperature and humidity control, and lighting. Use of energy by appliances. Evaluation of features in relation to their function and cost. Selection, use, and care of household equipment. Individual study related to the student's background and interests.]

**335 Textiles III: Structure and Properties**

Spring. 4 credits. Prerequisites: DEA 235; Physics 101, 112, or 207; and Chemistry 253 and 251, or 357–358 and 251.

Lecs, M W F 9:05; lab, M or W 1:25–4:25.

C. C. Chu.

An in-depth study of the structure of textile materials and their component parts, from polymer molecules through fibers and yarns to fabrics, and the techniques of controlling structure to achieve desirable end-use properties. Emphasis is on properties important to the consumer, including easy care, elasticity, durability, comfort, and aesthetics. Laboratory experimentation illustrates the important interrelationships among structures and properties of polymers, fibers, yarns, and fabrics.

**338 Textiles for Interiors and Exteriors**

Spring. 3 credits. Prerequisite: DEA 135 or permission of instructor. S-U grades optional.

T R 2:30–4:25. V. White.

This course reviews developments and trends in textiles for the home and for contract interiors.

Consideration is given to end-use requirements, to performance and test method standards and specifications, and to the environments on which these textiles are used. Field trips are arranged when feasible.

**[343 Design: Introductory Textile Printing**

Fall. 3 credits. Each section limited to 15 students. Prerequisites: DEA 101 and at least one other studio design course. Minimum cost of materials, \$50. Not offered 1983–84.

M W 1:25–4:25 or T R 10:10–1:10. C. Straight.

A studio design course covering the silk screen method of designing and printing fabric. All projects are printed on fabric using permanent fiber-reactive dyes. Projects cover the study of color, design of surface pattern, texture, and composition for fabrics.]

**348 Environmental Graphics and Signing**

Fall. 3 credits. Prerequisite: DEA 201 or design background or permission of instructor. Limited to 20 students. Priority given to DEA majors. Approximate cost of materials, \$25.

M W 10:10–1:10. M. Boyd.

A studio course dealing with both the functional and decorative aspects of environmental graphics. Includes projects in interior and exterior graphics, signing, and directional systems.

**349 Graphic Design**

Spring. 3 credits. Enrollment limited to 20 students. Prerequisite: DEA 201 or permission of instructor. Priority given to DEA majors. Approximate cost of materials, \$25.

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 also are covered. A series of projects explore problems typical to the graphic design field.

**350 Human Factors: The Ambient Environment**

Spring. 3 credits. Recommended: DEA 150.

M W F 12:20. G. Sloan.

An introduction to human-factor considerations in lighting, acoustics, noise control, and the thermal environment. The ambient environment is viewed as a support system that should promote human efficiency, productivity, health, and safety. Attention is given to the needs of special populations such as the elderly. Emphasis is placed on the implications for planning, design, and management of settings and facilities.

**[351 Selected Topics in History of Costume**

Spring. 3 credits. S-U grades optional.

Recommended: courses in history of art or cultural history. Not offered 1983–84.

M W 10:10–12:05.

A study of the relationship between costume and culture in selected periods of history from ancient times to the present. History is used as a resource for solving contemporary apparel needs. Lectures and class discussion are illustrated with items from the Cornell Costume Collection.]

**353 Historic Design III: Contemporary Design**

Spring. 3 credits. Prerequisite: DEA 101. Corequisite: DEA 111. Recommended sequence: DEA 251, 252, and 353.

M W F 10:10. G. C. Millican.

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 works of furniture, fabrics, and interiors.

**361 Residential Design**

Spring. 3 credits. Prerequisite: DEA 201 or 261, or permission of instructor. Recommended: DEA 135 and 350. Approximate cost of materials, \$30.

T R 8–11. G. C. Millican.

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.

**367 Apparel Design III**

Spring. 3 credits. Prerequisites: DEA 115, 240, and 264 or permission of instructor. Corequisites: DEA 235 and 117. Apparel design majors should take DEA 264 and 367 in the same academic year. Minimum cost of materials, \$60; lab fee, \$5.

M W 1:25–4:25. A. Racine.

Advanced apparel students prepared to challenge and refine their design skills will be presented with a variety of complex studio problems in apparel design. The Cornell Costume Collection is used for illustration and inspiration.

**400–401–402 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 forms available from the Counseling Office. This form must be signed by the instructor directing the study and the department chairman 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 chairman is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study:

**400 Directed Readings**

For study that predominantly involves library research and independent reading.

**401 Empirical Research**

For study that predominantly involves data collection and analysis, or laboratory or studio projects.

**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.

**[430 The Textile and Apparel Industries**

Fall. 3 credits. Prerequisites: Consumer Economics and Housing 233, DEA 235, or permission of instructor.

M W 12:20–2:15.

A critical review of the textile and apparel industries, including structure and marketing practices, and government policies that affect industry decisions and operations in such areas as energy, the environment, safety, international trade, and employee benefits and opportunities. The role of trade unions also is explored. A one-day field trip is arranged when feasible.]

**431 The Textile and Apparel Industries—Field**

Experiences

Second week of January intersession. 1 credit. Prerequisite or corequisite: DEA 430. S-U grades only. Offered alternate years. Students are responsible for trip expenses, approximately \$175. A one-week field experience in the textile regions of the South. Students have the opportunity to see various textile processes, including fiber production, knitting, weaving, dyeing and finishing, and designing. In addition, seminars with executives of each participating firm relate theory to current practice.

**[434 Care of Textiles]** Fall. 2 credits. Prerequisite: DEA 235. Not open to students who have taken DEA 230. Not offered 1983-84.

W 9:05 and F 9:05-11. M. Purchase.

The interaction of textiles with soils and stains, cleaning agents, and laundry equipment. Topics include characteristics of soils, mechanisms for bonding soils to substrates, textile properties and changes related to care processes, functional finishes, wet- and dry-cleaning processes, the supplies and techniques used in cleaning, and instructions for care.]

**436 Textiles IV: Textile Chemistry** Fall. 4 credits. Prerequisites: DEA 235; Chemistry 253 and 251 or Chemistry 357-358 and 251.

Lecs, M W F 11:15; lab, R 12:20-3:20.

K. Obendorf.

An introduction to the chemistry of the major classes of natural and man-made fibers, including their structure, properties, and reactions. Laboratories include the qualitative identification of textile fibers and consideration of chemical damage to fabrics, finishes, and dyes.

**437 Fabric Technology** Fall. 3 credits. Each lab limited to 15 students. Prerequisite: DEA 235. Offered alternate years. Approximate cost of text and supplies, \$40.

Lec, T R 10:10; lab, T or F 2:30-4:25. P. Schwartz. This course covers (1) how fabrics are made, (2) how the method of manufacture influences fabric properties, and (3) how the method of manufacture limits potential applications of fabrics. The technical aspects of textile fabrics are covered in detail. Available production technologies are reviewed. Properties of woven, knitted, and nonconventional fabrics, methods of producing structural designs, and means of designing fabrics to specifications are covered. Laboratory exercises include the analysis of different fabric samples to determine structure and method of construction. In later laboratory exercises students select a fabric application and determine the appropriate fabric construction specifications to satisfy the requirements of the application.

**438 Apparel Textiles** Fall. 3 credits. S-U grades optional. Prerequisites: DEA 235 and 264, or permission of instructor.

M W 2:30-4:25. Two-day field trips will be arranged when feasible. V. White.

A study of the interrelationships of aesthetics, fashion and function, and other trade-offs of concern to the consumer. Consideration of the use of standards, specifications, and other means of communication at consumer, government, industry interfaces. Individual or team projects. Seminars and lectures with required readings. Labs include evaluation of apparel.

**439 Textile Materials for Biomedical Use** Fall. 2 credits. S-U grades optional for non-DEA majors. Prerequisites: DEA 135, 235, or permission of instructor.

T 2:30-4:25. C. C. Chu.

Focuses on chemical and physical properties of textiles and the performance of textile materials (including structures for general hospital use and internal or external body use) clinically and in the laboratory. Typical materials include sutures, surgical dressings, elastic stockings, surgical apparel, and prosthetic materials. The impact of governmental regulations is also examined.

**445 Apparel Design IV: Functional Clothing Design** Fall. 3 credits. Prerequisite: DEA 367 or permission of instructor. Lab fee, \$5.

M W 10:10-11:30. S. Watkins.

Students learn to apply functional design theory to clothing for a wide range of activities and hazardous environments. Protective clothing and equipment for athletes, soldiers, astronauts, scuba divers, fire fighters, backpackers, and physicians are among those items typically covered. Each student executes a final project in his or her own special area of interest.

**455 Research Methods in Human-Environment Relations** Spring. 3 credits. Prerequisite: DEA 150 or permission of instructor. Recommended: a statistics course.

M W F 10:10. E. Ostrander.

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 unobtrusive and obtrusive data-collecting tools, the processing of qualitative and quantitative data, and effective communication of empirical research findings.

**459 Programming Methods in Design** Spring. 3 credits.

T R 10:10-11:30. G. Sloan.

An introduction to environmental programming, with an emphasis on the formulation of system requirements that follow from user characteristics and limitations. Diverse methods for determining the characteristics required of a particular environmental setting (in order that it support the desired behaviors of its users and operators) include systems analysis, behavior-circuits approach, behavior-settings approach, and user-characteristics approach. The student's ability to select appropriate methods to suit problems or, when necessary, to devise new methods or techniques is accentuated.

**465 Apparel Design V** Spring. 3 credits.

Prerequisites: DEA 117 and 367 or permission of instructor. Recommended: DEA 102 and 445. Minimum cost, \$60; lab fee, \$5.

M W 1:25-4:25. B. Ziegert.

Through studio problems in fashion design, students examine the influence of manufacturing technology and cost on the apparel designer. Lines of garments are developed to various stages, from sketches to finished samples.

**499 Design VII: Advanced Interior Design** Fall and spring. 1-8 credits. (The first time a student enrolls in DEA 499, it must be for a minimum of 4 credits. Students may elect up to 4 additional credits in DEA 499, to be taken concurrently or in a subsequent semester. Students are strongly encouraged to satisfy the basic 4-hour DEA 499 requirement in the fall semester and to continue with an additional 4-hour studio in the spring semester.) Prerequisites: DEA 301, 302, 303, and 304. DEA 302 and 499 may not be taken concurrently. Minimum cost of materials, \$120.

T R 1:25-4:25. Staff.

Advanced interior design studio. A comprehensive design-problem-solving experience involving completion of an advanced interior design problem from inception to implementation. Focus is on attainment of advanced proficiency in the application of substantive and procedural material from previous courses to a complex and realistic interior design problem selected by the student and approved by the instructor. The course is structured around five phases of activity of three or four weeks in duration: environmental assessment and programming, generation of alternative designs, evaluation of alternatives, development and refinement of selected alternative, design of implementation measures, and the preparation of a professional-quality report documenting the proposed design and the rationale and procedures utilized.

**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 chairmen and approved by the head of the department and instructor.

**[608 Shelter]** Fall. 3 credits. Undergraduates and non-DEA graduate students must have permission of the instructor. S-U grades optional.

A combination seminar and lecture course. Historical

aspects of housing since World War I: structures and materials, energy constraints, construction and manufacture, cost, physical and psychological human needs, and survey of housing patterns.]

**621 Textile-Fiber Evaluation** Spring. 3 credits

Prerequisites: DEA 335 or 436 or permission of instructor. S-U grades optional.

M W F 11:15. S. K. Obendorf.

Study of analytical methods, including electron spectroscopy, scanning and transmission electron microscopy, X-ray analysis, microprobes, X-ray diffraction and stress-strain analysis. Evaluation of the application of these techniques in textile and polymer science.

**630 Physical Science in the Home** Fall.

2 or 3 credits (3 credits require laboratory attendance). Prerequisite: college chemistry. S-U grades optional. Consult instructor before registering.

Lecs, T R 9:05; lab, W 12:20-2:15. M. Purchase. Applied physical science for professionals working with consumers and home appliances. Energy conservation is considered, selected principles from physics are applied to household equipment, and the chemistry of cleaning supplies and cleaning processes is studied.

**[635 Special Topics in Textiles]** Spring. 3 credits.

Prerequisite: DEA 235 and 335, or permission of instructor. Not offered 1983-84.

M W F 11:15. C. C. Chu.

Contemporary topics in polymers, fibers, and textiles. Emphasis on chemical, physical, and mechanical properties, and environmental effects on these properties. Current research results and research trends also are discussed. Topic changes each year; consult the instructor for more information.]

**[636 Advanced Textile Chemistry]** Spring. 4 credits. Prerequisite: DEA 436. Offered alternate years. Not offered 1983-84.

The chemistry and physicochemical properties of natural and synthetic rubbers, polyurethanes and other elastomeric materials, high-temperature polymers, and inorganic materials used as textile fibers, and the relationship between their chemistry and functional properties as textile materials. Other topics will include polymerization processes, textile finishing processes, dyes and dyeing, and degradation of textile materials under environmental conditions.]

**637 Seminar: Frontiers in Textiles** Fall and

spring. 1 credit a term. S-U grades only. Required every semester of all graduate students in textiles. Open to advanced undergraduates who have permission of instructor.

T 4:30-5:45. Staff.

New developments, research findings, and other topics of major concern to the field of textiles are discussed by faculty members, students, and guest speakers from industry, government, and academia. Seminars are of special interest not only to graduate textile students but to students and faculty members concerned with textile end products such as apparel, interiors, housing, and industrial applications. Students electing to take the seminar for credit are required to write a paper in their first term, to present a proposal for independent investigation in the second term, and to report on their findings in their third or fourth term.

**[639 Mechanics of Fibrous Structures]** Fall. 3 credits. Prerequisites: DEA 235 or equivalent or permission of instructor. Corequisite: DEA 335. Offered alternate years. Not offered 1983-84; next offered 1984-85.

Hours to be arranged. P. Schwartz.

A study of the pioneering research in the mechanics of textile structures: creep phenomena and the dynamic properties of fibers and yarns; idealized yarn and fabric models and their relationship to research data; special topics in the deformation of yarns and fabrics in tensile, shear, and compression stress; fabric bending and buckling; and the mechanical behavior of nonwoven textile materials.]

**640 Adaptive Building Reuse** Spring. 5 credits. Limited to 15 students. Approximate cost of materials, \$100.

T W R 1:25–4:25. L. Mankowski.

This design course incorporates adapting and reusing existing urban structures. Includes the analysis of existing conditions, market feasibility, codes and ordinances that impact on the design methodology. Housing will be included in the problem. There will be two required field trips: (1) to visit site and meet with persons responsible for the project and (2) to visit completed retrofit examples in a major city.

**648 Standards and the Quality of Life** Spring. 3 credits. S-U grades optional. Limited to graduate students. Open to advanced undergraduates who have permission of instructor.

Hours to be arranged. V. White.

This course is designed to provide an awareness of the dynamic process of developing standards. What are standards? Who makes them? How do they affect the individual, the nation, business, industry, and government? Consumer product standards as a category will be considered, and both voluntary (such as ISO, ANSI, ASTM) and governmental regulatory procedures in the development of standards are reviewed. The development and use of standards are studied using case histories (for example, solar housing, apparel sizing, textile labeling, meat products, recreation safety). Lectures, discussion, and simulation of a variety of standards-development activities give students opportunities to participate in the process. Consideration is given to interactions among government, industry, and consumer groups, and to the interfaces between voluntary and mandatory standards and between national and international standardization systems.

**650 Programming Methods in Design** Spring. 4 credits. Recommended: DEA 325, 350, and 455. T R 10:10–11:30, plus hour to be arranged.

G. Sloan.

A course intended for the graduate student who wants 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.

**653 Psychology of Office Design** Spring. 3 credits. Prerequisite: DEA 250 or permission of instructor.

M W 2:30–4. F. Becker.

Intended for students interested in the management and administration of organizations as well as those interested in their design. Examination of the ways in which office design influences behaviors such as conflict, cooperation, group cohesiveness, feedback, job satisfaction, and effectiveness. The social and organizational impact of new furniture and electronic equipment systems, as well as work done in alternative settings such as the home, is also discussed. Consideration is given to social forces underlying the development of office environments, including office standards and planning processes. Emphasis is on implications for the planning, design, and management of office environments.

**655 Dynamics of Collaboration in the Design Process** Fall. 3 credits. Prerequisites: a course in elementary psychology and DEA 250, 350, and 455.

M W F 11:15. E. Ostrander.

The role of clients, designers, users, and special consultants in working collaboratively to develop physical and social systems for living, working, and recreation. The structuring of group process to maximize effective collaboration. The procedures for collating and integrating behavioral data into formats that nonresearchers can understand as a basis for decision making. Familiarity with interaction process models that can be applied to the special problems of interdisciplinary work with the design and management professions.

**656 Research Methods in Human-Environment Relations** Spring. 4 credits. Letter grades only.

Prerequisites: DEA 150 or permission of instructor.

Recommended: a statistics course.

M W F 10:10, plus hour to be arranged.

E. Ostrander.

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.

**659 Seminar on Facility Planning and Management** Fall. 1 credit. S-U grades only.

Expected every semester of graduate students majoring and minoring in environmental analysis/human-environment relations.

Hours to be arranged. Staff.

Seminar on current issues and content in the field of facility planning and management. Discussion by faculty, students, and invited guests.

**660 The Environment and Social Behavior** Fall. 4 credits. Prerequisite: DEA 150 or permission of instructor.

M W 10:10–12:05, plus hour to be arranged.

F. Becker.

A combination seminar and lecture course for graduate students with interests in social sciences or design. Graduate students attend DEA 250 lectures but have more extensive readings and meet an additional hour each week.

**699 Master's Thesis and Research** Fall or spring. Credits to be arranged. Prerequisite: permission of the chairperson of the graduate committee and the instructor. S-U grades optional.

Hours to be arranged. Department graduate faculty.

## Human Development and Family Studies Courses

H. Ricciuti, chairperson; B. Koslowski, graduate faculty representative; M. Basseches, H. T. M. Bayer, W. L. Brittain, U. Bronfenbrenner, J. Brumberg, S. Ceci, M. Cochran, J. Condry, S. Cornelius, J. Doris, G. Elder, H. Feldman, J. Gebhardt, S. Gillis, S. Hamilton, J. Harding, C. Howard, E. Kain, L. C. Lee, B. Lust, P. Moen, M. Potts, R. Savin-Williams, P. Schoggen, G. Suci, M. Thomas, E. Walker, S. West, P. Ziegler

**111 Observation** Fall. 3 credits. Not open to first-semester freshmen.

M W F 11:15. P. Schoggen.

An overview of methods of observing people and the settings in which they behave in order to develop observational skills, increase understanding of behavior and its development, and acquaint students with basic methodological concepts underlying the scientific study of behavioral development. Direct experience in applying observational methods in laboratory and real-life settings is emphasized. Discussion groups accompany the observation experience.

**115 Human Development: Infancy and Childhood** Fall or summer. 3 credits. S-U grades optional.

M W F 11:15. S. Ceci.

Provides a broad overview of theories, research methods, and the status of scientific knowledge about human development from infancy through childhood. Attention is focused on the interplay of psychological factors, interpersonal relationships, social structure, and cultural values in changing behavior and shaping the individual.

**116 Human Development: Adolescence and Youth** Spring. 4 credits; summer, 3 credits. S-U grades optional.

Lecs, T R 12:20–2:15. R. Savin-Williams, M. Basseches.

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.

**117 Human Development: Adult Development and Aging** Spring. 3 credits. S-U grades optional.

M W F 2:30. S. Cornelius.

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.

**[141 Introduction to Expressive Materials]** Spring. 3 credits. Limited to 18 freshmen and sophomores. Not offered 1983–84.

T R 2:30–4:25. W. L. Brittain.

Designed to explore the means and materials suitable for creative expression for children of different ages as well as for adults. Students are expected to acquire competence in evaluating and utilizing various media and understanding the creative process. Experimentation in paint, clay, chalk, crayon, paper, wire, plaster, wood, and other materials.]

**150 The Family in Modern Society** Fall or summer. 3 credits. S-U grades optional.

M W F 1:25. P. Moen.

Contemporary family roles and functions are considered as they appear in United States history, as they change over the life cycle, and as they are influenced by the locales in which families live and the social forces that impinge on them.

**201 Sociological Analysis of Contemporary Issues (also Sociology 201)** Fall. 3 credits. Human ecology students must register for HDFS 201.

M W F 11:15. R. L. Breiger and staff

With its emphasis on the evaluation of case studies and research reports, this course aids in the development of analytical skills and critical abilities. An introduction to the foundations of sociological analysis is followed by student participation in three other modules. Each module concentrates on one social issue of vital concern, while illustrating the distinctive ways in which sociologists define questions, evaluate the answers, and build upon previous research.

**[212 Early Adolescence]** Fall. 3 credits

Prerequisite: HDFS 116. Strongly recommended: a course in biology. S-U grades optional. Not offered 1983–84.

T R 12:20–2:15. R. Savin-Williams.

Examines the period of the life course during which the biological changes of pubescence occur. The impact of these changes on individual behavior, interpersonal relations with peers and family, the relationship of the individual to society, and individual psychological development in general are explored. The course places heavy emphasis on writing skills (several five-page papers) and critical thinking (critiques of published research).]

**218 From Adolescence to Adulthood: Developmental Issues** Fall. 3 credits. Prerequisite: HDFS 116. S-U grades optional. Offered alternate years.

T R 2:30–3:45. M. Basseches.



Explores effects on individual and society when many people well beyond puberty are not yet granted full adult status or do not assume typical adult roles and responsibilities (for example, students, transients, people experimenting with alternative life-styles). Considers both the unique developmental potentials and the stresses of youth associated with questioning of what it means and what it takes to become a full member of adult society. Intimacy, vocational choice, life-style choice, religious and political commitment, moral judgment, intellectual functioning and orientation, self-concept, and authority and dependence relations are treated as developmental and stressful issues of this period, and several of these are examined in depth.

**242 Participation with Groups of Children in the Early Years** Fall and spring. 4 credits (3 credits with permission of instructor). Limited to 20 students (limit depends on availability of placements and of supervision). Prerequisite: HDFS 115. Recommended: HDFS 111 or ID 100. S-U grades optional.

Fall: W 12:20–2:15. Spring: W 10:10–12:05. Plus two half-days of fieldwork (for 4 credits) or one half-day of fieldwork (for 3 credits). Staff.

A field-based course designed to combine experience in child-care centers with theory and supervision, intended to develop the student's ability to understand and relate effectively to young children. Course structure integrates lectures and discussions, workshops, films, projects, reading, writing, and sharing of field experiences. Students are placed in local nursery schools, day-care centers, Head Start programs, and kindergartens.

**243 Participation with Groups of Children Ages Six through Twelve** Fall. 4 credits (3 credits with permission of instructor). Limited to 20 students (limit depends on availability of placements). Prerequisite: HDFS 115. Recommended: HDFS 111.

R 10:10–12:05, plus two half-days of fieldwork (for 4 credits) or one half-day (for 3 credits). P. Ziegler.

A field-study course structured to integrate knowledge from practicum, lectures, discussions, and readings to provide a better understanding of child development in the school setting. Each student will work in one classroom with an experienced teacher.

**258 Historical Development of Women as Professionals, 1800–1980 (also Women's Studies 238 and Sociology 238)** Fall. 3 credits. S-U grades optional. Human ecology students must register for HDFS 258.

T R 2:30–4. J. Brumberg.  
The historical evolution of the female professions in America (midwifery, nursing, teaching, librarianship, prostitution, home economics, and social work) as well as women's struggles to gain access to medicine, law, the clergy, and the academy. Consideration of history of women in medicine and law as well. 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 structure, and American society is also discussed.

**270 Atypical Development** Spring. 3 credits. Prerequisites: HDFS 115, Psychology 101, or Education 110.

M W F 9:05. S. Ceci.  
An introduction to the psychology and education of exceptional individuals. Attention is given to the etiology and characteristics of major types of exceptionality, including learning disorders, intellectual giftedness, creativity, perceptual impairments, and the bicultural individual.

**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 forms available from the Counseling 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.

**[302 Family and Community Health** Fall or spring. 3 credits. S-U grades optional. Not offered 1983–84.

T R 1:25; sec 1, T 2:30; sec 2, R 2:30. Staff.  
This introduction to health science focuses on research and knowledge related to personal, family, and community responsibility for healthful living, disease prevention, and the environmental problems that affect the quality of health throughout the life cycle. Substantive material includes physical, mental, and emotional functioning; chemical alteration of behavior; family health; personal health care; and health in society. Discussion sections deal with decision making and application of theory in health science.]

**[307 Collective Behavior and Social Movements (also Sociology 307)** Fall. 4 credits. Prerequisite: a course in sociology or another social science. Human ecology students must register for HDFS 307. Not offered 1983–84.

T R 2:30–4. G. Elder.  
An inquiry into social behavior that breaks with institutionalized or conventional forms, such as acting crowds, riots, social movements, and revolution. Analysis of antecedent conditions, emergent forms, processes, and consequences. Historical and contemporary studies are covered.]

**[313 Problematic Behavior in Adolescence** Spring. 3 credits. Prerequisites: HDFS 116 and one other course on adolescence. Students interested in adding related field experience should register concurrently for HDFS 410 or 411. Offered alternate years. Not offered 1983–84.

M W F 2:30. Staff.  
Focuses primarily on juvenile delinquency and other problems of adolescence such as drug abuse, alcohol, pregnancy, suicide, and other social and personal issues.]

**315** (See Human Service Studies 315, Human Sexuality).

**333 Cognitive Processes in Development** Fall. 3 credits. Prerequisite: HDFS 115 or equivalent.

M W F 11:15. 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.

**338 The Development of Creative Thinking** Spring. 3 credits. Prerequisites: HDFS 115, Psychology 101, or Education 110. Not to be taken concurrently with HDFS 141.

M W F 10:10. W. L. Brittain.  
A study of theories of creativity and a review of the research on creative behavior. Emphasis is on the conditions and antecedents of creative thinking.

**[342 Models and Settings in Programs for Young Children** Fall. 3 credits. Prerequisite: HDFS 115. Not offered 1983–84.

T R 12:20–1:35. S. West.  
Examines the theoretical and philosophical bases and specific implementation of a wide variety of programs (i.e., Montessori, behavioral, Piaget, Bank Street Model). Students are encouraged to develop their own positions in regard to values and psychological theories. Applications of various approaches to programs for children and families with special needs also are studied.]

**[344 Infant Behavior and Development** Spring. 3 credits. Prerequisite: HDFS 115 or equivalent. Not offered 1983–84.

T R 12:20–1:35. H. Ricciuti.  
Nature and determinants of major developmental changes in infant behavior from birth to two years. Special attention is directed to the role of major environmental influences on perceptual and cognitive, and social and emotional development, and to recent attempts to modify infants' experiences in the interest of facilitating psychological development.]

**346 The Role and Meaning of Play** Spring. 2 credits. Limited to 30 students. Prerequisites: HDFS 115; HDFS 111 preferred.

W 7–9 p.m. J. Gebhardt.  
The aim of this course is to examine the play of children aged 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.

**347 Human Growth and Development: Biological and Social Psychological Considerations (also Nutritional Sciences 347)** Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent, and HDFS 115 or Psychology 101.

M W F 1:25. J. Haas, H. Ricciuti.  
A review of major patterns of physical growth from the fetal period through adolescence, with consideration given to biological and socioenvironmental determinants of growth, as well as to physical and psychological consequences of variations in growth patterns. Normal patterns of growth are examined, followed by an analysis of major sources of variations in growth (normal and atypical).

**348 Advanced Participation in Preschool Settings** Fall and spring. 3 credits. Limited enrollment. Prerequisites: HDFS 242 and permission of instructor. Prerequisite or corequisite: HDFS 346.

Two half-days participation (morning or afternoon) and an hour conference each week. Staff.  
An advanced, supervised fieldwork experience with a focus on helping children build relationships to support learning and personal development. Students are expected to define their own goals and assess progress with supervising teacher and instructor; to keep a journal; and to plan, carry out, and evaluate activities for children in a variety of curriculum areas.

**354 The Family in Cross-cultural Perspective** Spring. 3 credits. Prerequisites: HDFS 115 or 116, Psychology 101 or Education 110, and HDFS 150 or Rural Sociology 100, or equivalent. S-U grades optional.

M W F 10:10. E. Kain.  
The sociological study of families from a comparative perspective, looking at similarities and differences across cultures and across ethnic groups. A major focus is on the interdependence of the family system and social institutions.

**358 Theories of Adult Interpersonal Relationships** Fall. 3 credits. S-U grades optional.

R 2–4:25. H. Feldman.  
Selective theories of the basic disciplines in social psychology, sociology, and psychology are reviewed and their pertinence to understanding of adulthood examined. Students generate hypotheses about these theories and test one of them through either a library or empirical paper. A journal is kept to interrelate the concepts and to suggest practical applications.

**359 American Families in Historical Perspective (also Sociology 359 and Women's Studies 357)** Spring. 3 credits. S-U grades optional. Prerequisites:

HDFS 150 or one 200-level social science or history course. Human ecology students must register for HDFS 359.

T R 2:30–4. 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.

### 360 Personality Development in Childhood

Spring. 3 credits. Prerequisites: HDFS 115 or Psychology 101, plus one other course in HDFS or psychology.

M W F 11:15. L. C. Lee.

Study of relevant theoretical approaches to and empirical findings regarding the development of the child's personality. The influence of parents and other environmental factors on the child are examined. Topics covered include attachment, autonomy, identification, moral development, and social behavior.

### [361 The Development of Social Behavior

Spring. 3 credits. Limited to 100 students. Prerequisite: HDFS 115 or Psychology 128. Not offered 1983–84.

M W F 11:15. Staff.

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, childbearing, 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.]

### 365 The Study of Lives

Spring. 3 credits. Prerequisites: HDFS 115 and 116.

M W F 9:05. J. Harding.

The study of personality development through the analysis of individual life histories. Biological, sociological, and psychodynamic influences are given approximately equal emphasis. There is extensive discussion of the development of motives, decision making, and personal relationships. The term paper is a psychological analysis of a specific individual based on a published biography or autobiography.

### 371 Behavioral Disorders of Childhood

Fall. 3 credits. Prerequisites: Psychology 101 or Education 110, and a course in personality development (such as HDFS 270 or an equivalent).

M W F 12:20. E. Walker.

Considers the psychological disorders of childhood ranging from transient adjustment reactions to psychoses. The disorders will be studied in view of theories regarding etiology, treatment, and primary prevention.

### [372 Deviations in Intellectual Development

Spring. 3 credits. Prerequisites: HDFS 115 and a course about personality. Not offered 1983–84.

M W F 12:20. S. Ceci.

Major forms of organic and familial retardation, perceptual and motor handicaps, and learning disabilities are considered with reference to problems of development, prevention, and remediation.]

### 380 Aging and Health

Fall. 3 credits. Prerequisite: HDFS 117.

M W F 9:05. J. Harding.

General introduction to health problems of the elderly and arrangements for dealing with them. The course discusses normal biological changes with advancing age, major age-related diseases, the American health-care system, and the use of health services by the elderly. Some attention is given to health care for the elderly in other Western societies and to current policy issues in the United States.

### 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. Offered alternate years.

T R 10:10–11:40; lab, hours to be arranged.

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.

### 398 Junior Honors Seminar

Spring. 1–3 credits. Permission of the director of the honors program required for registration. Enrollment limited to students in the honors program.

Hours to be arranged. J. Harding.

Reports and discussion of selected thesis topics by honors students.

### 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 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 forms available from the Counseling Office. This form must be signed by the instructor directing the study and the department chairman 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 chairman is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study:

### 400 Directed Readings

For study that predominantly involves library research and independent study.

### 401 Empirical Research

For study that predominantly involves data collection and analysis, or laboratory or studio projects.

### 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.

### 403 Teaching Apprenticeship

For study that includes assisting faculty with instruction.

### 404 Projects in Public Policy (also Government

500)

Fall and spring. 4–6 credits. Limited to juniors, seniors, and graduate students. Enrollment by permission of instructor and HDFS faculty sponsor.

Hours to be arranged. Chairman, Cornell-in-Washington Program and staff.

A full-semester internship in Washington, D.C., designed to afford students an opportunity to study the actual formulation and implementation of public policy. Types of placement include assignment in a

Congressional office, in an executive department or agency, with a political campaign organization, or with a lobby or interest group. Students spend at least twenty-five hours each week in their placement and two hours biweekly in group seminar, and have a weekly conference with the instructor, who is a member of the Cornell-in-Washington staff. Since enrollment is limited and students must apply to agencies with openings and be accepted by them, students desiring to participate in this program should contact the course instructor, indicating their interest by the middle of the semester preceding the semester of desired participation. Prior to enrollment in this course, students must also identify an HDFS faculty sponsor who is knowledgeable in the subject area in which they wish to do the required research report. The Departmental Advising Coordinator may be contacted for the names of prospective faculty sponsors.

### 410 Field Experience in Adolescent Development: The Individual in Community Settings

Fall. 3–9 credits. Prerequisites: HDFS 116 and one additional course in adolescence, a skills-training course or equivalent experience, and permission of instructor. S-U grades optional.

M 7:30 p.m. C. Howard.

Designed to give students experience working with typical and atypical adolescents in such settings as legal, educational, and social service agencies. Examines the development of the individual adolescent within the community setting.

### 411 Field Experience in Adolescent

Development: Social Policy toward Youth

Spring 3–9 credits. Enrollment limited by availability of fieldwork placements. Prerequisite or corequisite: HDFS 313 or 414, a skills-training course or equivalent experience, and permission of instructor. S-U grades optional.

Lec, M 7:30 p.m., plus field study. C. Howard.

Designed to give students experience working with typical and atypical adolescents in such settings as legal, educational, and social service agencies. Examines social policy and programming and its impact on youth.

### [414 Policies and Programs for Adolescents

Spring. 3 credits. Prerequisites: HDFS 116, and 212 or 218, or permission of the instructor. S-U grades optional. Offered alternate years. Not offered 1983–84.

T R 2:30–4. S. Hamilton.

Plans and practices intended to foster adolescent development are examined in the light of needs identified by theory and research. The key question is how societal and governmental institutions support or hinder the transition of adolescence to adulthood. Current issues such as secondary school reform, youth employment, and teenage pregnancy provide focal points for examining actual and proposed policies and programs.]

### [418 Work and Human Development

Fall. 3 credits. S-U grades optional. Prerequisites: background in adolescent and adult development or work-related courses, and permission of instructor. Offered alternate years. Not offered 1983–84.

M 7:30. M. Basseches.

Explores the usefulness of developmental theory as a basis for enhancing understanding of the nature and meaning of work for both adolescents and adults. In exploring the workplace as a context for human development the course addresses itself to problems of vocational training and counseling, of workplace reorganization, and of improving the quality of working life.]

### 431 Learning in Children

Fall. 4 credits.

Prerequisite: HDFS 115 or equivalent.

W 12:20–2:15; field experience to be individually arranged. M. Potts.

Consideration of the theoretical and research literature in processes of learning. Includes the interrelations of learning and development, and

learning and intelligence. Examines theories and models of learning as well as variables that affect the learning process. Application is made to the assessment of cognitive and social learning through laboratory and fieldwork.

**[432 Intellectual Development and Education]** Spring. 3 credits. Prerequisite: HDFS 115 or equivalent. Not offered 1983–84.

T R 2:30. 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; reasoning processes that underlie logical inference, classification, and seriation) and reviews basic and current research on the development and learning of these processes in young children. In addition, the course considers the implications of theories of development to various approaches to education (for example, the relevance of Piagetian developmental theory to standard and alternative education models.)

**434 Piaget's Theory of Cognitive Development** Spring. 4 credits. Open to undergraduate and graduate students. Prerequisite: HDFS 115 or equivalent. S-U grades optional. Offered alternate years.

Lecs, M W F 1:25–2:15. Staff.

This introduction to Piaget's theory of intellectual development is intended to provide students with a basic and critical knowledge of Piaget's theory of intelligence. The course reviews Geneva research on object permanence, the development of logic, number, classification, and seriation, and formal operations of scientific thinking. Research on representation, through mental imagery and language, for example, are also discussed, as are current attempts to extend Piagetian theory to educational practice. Related research in these areas also is considered briefly.

**[436 Language Development (also Psychology 436)]** Spring. 4 credits. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. Recommended: a course in linguistics. Offered alternate years; not offered 1983–84.

T R 10:10–12:05. B. Lust.

A survey of basic literature in language development. Major theoretical positions in the field are considered in the light of studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The acquisition of communication systems in nonhuman species such as chimpanzees are addressed, but major emphasis is on the child. The fundamental issue of relationships between language and cognition is also discussed.]

**437 Creative Expression and Child Growth** Fall. 4 credits. Limited to 25 students. May be added during first week only.

T R 10:10–11:30. Saturday mornings should be free to provide time for participation with children. W. L. Brittain.

Aimed at an appreciation and understanding of the creative process in art, music, dance, and drama in relation to the development of children.

**438 Thinking and Reasoning** Spring. 3 credits. HDFS 333 or permission of instructor.

T R 2:30–4. 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, causal reasoning, and scientific 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.

**440 Internship in Cornell Nursery School** Fall or spring. 10–12 credits. Prerequisites: HDFS 115 and 242. Recommended: HDFS 346 and 348.

M–F 8:00–1 or M–F 10:30–4:30. Staff. Internship in Cornell Nursery School. Opportunity to integrate theory with practice and to develop understanding of preschool children and their families. Placement as assistant teacher in the morning or afternoon program and participation in curriculum planning, evaluation, staff meetings, home visits, parent conferences, and parent meetings. Supervision by head teacher and director.

**[441 The Development of the Black Child]** Fall. 4 credits. Limited to juniors, seniors, graduate students, and students who have permission of the instructor. Prerequisite: HDFS 115 or equivalent. S-U grades optional. Not offered 1983–84.

T R 12:20–2:15. Staff.

This course provides comprehensive understanding of the development of black children independent of the comparative or deficit models, a critical evaluation of theories and methods that have been used in the past, and an introduction to proactive ways of conceptualizing the development of black children in the United States, the Caribbean, and Africa within a cultural context. Topics include physiological, psychomotor, and cognitive development; intelligence; language; personal and extended identity; and alternative models for socialization.]

**456 Families and Social Policy** Spring.

3–4 credits. Prerequisite: one course in the area of the family or in sociology. S-U grades optional.

T R 10:10–11:40. 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.

**483 Development in Context** Spring. 3 credits.

Open to juniors, seniors, and graduate students. Prerequisites: one course in statistics and two courses in social sciences, or one in human biology and one in social sciences.

M W F 9:05. U. Bronfenbrenner.

The course presents a systematic examination of existing research on human development throughout the life span in the actual environments in which people live. Attention is focused on the interplay between biological and environmental influences. These influences derive both from the immediate settings containing the developing person and the larger cultural and historical context in which they are embedded. Implications are drawn for public policy and practice.

**499 Senior Honors Thesis** Fall or spring. Credit to be arranged. Prerequisite: permission of thesis adviser and director 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 the instructor required.

Hours to be arranged. Department faculty.

This series of courses provides an opportunity for advanced undergraduates to explore an issue, theme, or body of 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.

#### 415 Topics In Adolescent Development

#### 435 Topics In Cognitive Development

#### 445 Topics in Early Childhood Education and Development

#### 455 Topics in Family Studies

#### 465 Topics In Social and Personality Development

#### 475 Topics in Atypical Development

#### 485 Topics in the Ecology of Human Development

### The Graduate Program

Human development and family studies graduate courses are open to undergraduates only with instructor's permission.

#### Methodology Courses

**[601 Research Design and Methodology]** Spring. 3 credits. Not offered 1983–84.

T R 10:10–12:05. Staff.

The seminar consists of three components: (1) discussion of representative literature on problems of research design, methodology, and data collection; (2) analysis of methodological issues involved in empirical studies employing different kinds of research designs and methods, both in laboratory and field settings; and (3) a practicum in which students formulate research designs for their own problems, to be evaluated and criticized at each stage of development and pretesting.]

#### General Courses

**617 Adolescence** Fall. 3 credits.

Time to be announced. M. Basseches.

Critical examination of some seminal theoretical writings on adolescent development, along with recent work relevant to intellectual development, ego development, and social development during late adolescence. Three approaches to human development that have stressed the importance of adolescence—psychoanalysis, structural developmental theory, and critical social theory—are interrelated. Empirical research on specific questions chosen by students is considered in the light of these approaches.

**631 Cognitive Development** Spring. 3 credits

T R 2:30–4. B. Koslowski.

Overview of current research and theoretical issues in cognitive development, with special emphasis on the sorts of areas relevant to real-world (as opposed to laboratory) behavior and on the sorts of cognitive phenomena that can be detected by human observers (rather than phenomena that can be detected only with the aid of technical equipment).

**640 Infancy** Fall. 3 credits.

R 10:10–12:35. H. Ricciuti.

Critical review of major issues of contemporary concern in the field of infant behavior and development, based on readings of selected research papers and review articles. The overall intent is to develop an analytic understanding of where the field stands at present with respect to various topical issues and to identify directions for future research.

**641 Early-Childhood Education** Fall. 3 credits.

M 12:20–2:50. M. Potts.

Survey of major issues in the theoretical and research literature of early-childhood education.

**650 Contemporary Family Theory and Research** Fall. 3 credits.

Lecs, M W 9:05–10:20. E. Kain.

The uses of sociological theories and research in the study of the family are studied with particular reference to the relationship between the family and society and between the family and its individual members.

**660 Personality and Socialization** Fall. 3 credits. W 2-4:25. Staff.

Major issues in personality development and socialization, with special emphasis on theoretical models and empirical issues.

**670 Atypical Development** Spring. 3 credits.

Prerequisite: undergraduate course in abnormal psychology or psychopathology.

W 1:25-4:25. E. Walker.

Overview of current theories and empirical research on functional and organically based psychological disorders. Topic areas to be covered include autism, schizophrenia, neuroses, and personality disorders. Focus is on developmental aspects of abnormal behavior.

**686 The Course of Life: Developmental and Historical Perspectives (also Sociology 658)**

Spring. 3 credits. S-U grades optional. Enrollment limited to 15. Prerequisite: permission of instructor. Human ecology students must register for HDFS 686. Time to be announced. G. Elder.

An introduction to the life course as a theoretical orientation, methodology, and field of study. Special emphasis is devoted to multidisciplinary convergence on life-course problems; to theory and research on the interaction of social, psychological, and biological processes from birth to death; and to historical influences.

**691 Research Practicum in the Ecology of Human Development** Spring. 3-4 credits. Open to graduate students and upperclass students by permission of the instructor.

Hours to be arranged. U. Bronfenbrenner, M. Cochran, W. Cross.

Students have the opportunity to participate in various phases of an ongoing five-nation study on the impact of family support systems on family function and the development of the child.

**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.

**618 Seminar in Adolescence**

Topics include peer relations, parent-teen relationships, self-esteem, youth and history, work, and moral development.

**633 Seminar on Language Development**

Topics include acquisition of meaning in infancy, precursors of language in early infancy, and atypical language development.

**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.

**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.

**646 Seminar in Early-Childhood Education**

Topics include analysis of models and settings, design of assessment techniques, program evaluation, and early-childhood in a cross-cultural context.

**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.

**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.

**675 Seminar in Atypical Development**

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.

**685 Seminar in Human Development and Family Studies**

Topics include development of self-concept, sex-role identity, observational methods, and interviews in developmental research.

**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**

**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 chairman with approval of the instructor.

**700 Directed Readings**

For study that predominantly involves library research and independent study.

**701 Empirical Research**

For study that predominantly involves collection and analysis of research data.

**702 Practicum**

For study that predominantly involves field experience in community settings.

**703 Teaching Assistantship**

For students assisting faculty with instruction. Does not apply to work for which students receive financial compensation.

**704 Research Assistantship**

For students assisting faculty with research. Does not apply to work for which students receive financial compensation.

**705 Extension Assistantship**

For students assisting faculty with extension activities. Does not apply to work for which students receive financial compensation.

**706 Supervised Teaching**

For advanced students who assume major responsibility for teaching a course. Supervision by a faculty member is required.

**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.

**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

D. Barr, chairman; J. Ford, graduate faculty representative; A. Hahn, undergraduate advising coordinator for social planning option; J. Allen, R. J. Babcock, H. Burris, D. Deshler, A. Parrot Eggleston, I. Lazar, C. C. McClintock, C. A. McLennan, M. Minot, B. J. Mueller, L. A. Noble, C. Reed, D. Ritchie, C. Shapiro, L. Street, D. Tobias, W. Trochim, B. L. Yerka, J. Ziegler

**202 Structure of Community Services** Fall and spring. 3 credits.

T 1:25-2:15, R 12:20-2:15. I. Lazar, D. Ritchie.

A lecture and discussion course designed as an introduction to the community base of services. The presence or absence of educational, social, and planning services, as well as their place and performance, are examined in the context of theoretical and empirical community dimensions. Examples of such dimensions include community complexity, differentiation, modernity, ethnicity, and community role.

**203 Groups and Organizations** Fall and spring 3 credits.

M W F 10:10. 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).

**246 Ecological Determinants of Behavior** Fall 3 credits. Preference given to HSS Option II students.

Prerequisites: introductory sociology and psychology, a human development course, and permission of instructor.

M W 2:30-3:45. D. Ritchie.

Compares conceptual models of human behavior, encouraging the student to incorporate an ecological model into her or his personal-professional framework. Introduces ecological perspective on social problems and professional practice in human services and social work in particular. The ecological-systems approach embodies holistic philosophy and concern with interaction and "goodness of fit" between people and environment. Emphasis on bio-psycho-social functioning of the person-in-situation and valuing human diversity.

**292 Research Design and Analysis** Fall or spring. 3 credits. Limited to 50 students. Prerequisite: a basic course in psychology or sociology.

T R 2:30-3:45. W. Trochim and staff.

Students should develop skill in analyzing and evaluating research reports. Readings and periodic assignments and exercises focus on stating hypotheses, designing studies to test hypotheses, measuring variables, and interpreting findings. The major project is a research paper that is critiqued before the final draft is submitted.

**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 forms available from the Counseling Office. This form, signed by both the instructor directing the study and the head of the department, should be filed at course registration or during the change-of-registration period.

**315 Human Sexuality** Fall, spring, or summer. 3 credits. Limited to 100 students. Prerequisites: an introductory course in human development and family studies, psychology, or sociology (or equivalent social science course), plus one course in biology. S-U grades optional.

T R 1:25; sec to be arranged. Evening prelims: fall, Oct. 20; spring, to be announced.

A. Parrot Eggleston.

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. Three central themes are addressed: the development of sexual orientation over the life cycle, the evolution of sexual norms and customs within changing sociopolitical systems, and the biological components of human sexual development. 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. There will be an evening midterm given in Bailey Hall.

**325 Health-Care Services and the Consumer** Spring. 3 credits. S-U grades optional.

T R 10:10–11:25. A. Parrot Eggleston.

Developments in the health field that affect the availability and kinds of health services. Emphasis is placed on interrelationships between institutions and agencies and the part each can play in prevention, diagnosis, and treatment of disease and disability. Focus will include historical and current trends, quality health care, consumer issues, and the problems of health care.

**330 Ecology and Epidemiology of Health** Fall. 3 credits. S-U grades optional.

T R 10:10–11:25. A. Parrot Eggleston.

Ecological and epidemiological approaches to the problems of achieving human health within the physical, social, and mental environment. The course introduces epidemiological methods to the student and surveys the epidemiology of specific diseases.

**339 Ecological Approach to Instructional**

**Strategies** Fall. 3 credits. Limited to 20 students. Priority given to HSS majors. Prerequisite or corequisite: a course in educational psychology.

T R 12:20–2:15. A. McLennan.

This laboratory course provides theoretical frameworks for observation, analysis, and practice of various teaching behaviors and their effects on learners. Similarities and differences in teaching youths and adults are explored, and the influences of the settings are considered. Students select age groups and settings in the community in which to use process skills, teaching, and interaction strategies. To facilitate learning, these are videotaped and critiqued. Observations of schools or community learning activities are arranged.

**370 Social Welfare as a Social Institution** Fall. 3 credits. Prerequisite: HSS 202 or permission of instructor.

M W F 9:05. 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.

**400–401–402–403 Special Studies for**

**Undergraduates** Fall or spring. Credits to be arranged. S-U grades optional. Limited to HSS, interdepartmental, and independent majors.

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 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 forms available from the Counseling Office. This form must be signed by the instructor directing the study and the department chairman 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 chairman is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study.

**400 Directed Readings**

For study that predominantly involves library research and independent readings.

**401 Empirical Research**

For study that predominantly involves data collection and analysis or laboratory or studio projects.

**402 Supervised Fieldwork**

For study that predominantly involves both responsible participation in a community or classroom setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

**403 Teaching Apprenticeship** Prerequisite:

Students must have taken the course (or equivalent) in which they will be assisting and demonstrated a high level of performance.

For study that includes assisting faculty with instruction.

**411 Introduction to Adult Education** Fall.

3 credits. Limited to 45 students. Preference given to HSS majors. S-U grades optional.

T R 10:10–12:05. H. Burris.

Focuses on the broad aspects of adult education, scope and history of adult-education programs, philosophy and principles, perspective of the adult learner, media and methods of instruction, and program development. Opportunities are provided for observation of adult-education programs in community organizations and agencies.

**414 Practicum** Fall or spring. 6 credits. Sec A

limited to HSS Option I or III majors who have completed the prerequisites planned with their adviser; sec B limited to Interdepartmental Option I majors. Prerequisite: permission of the option adviser and agency field preceptor.

Department faculty.

An opportunity for a student to assume a professional role and responsibilities under the guidance of a preceptor in a community-service organization. Conferences involving the student, field preceptor, and college supervisor are arranged in a block, scheduled throughout the semester, or completed in the summer session, depending on the nature and location of the student's fieldwork.

**[416 The Helping Relationship** Fall. 3 credits

Each section limited to 20 students. S-U grades optional. Not offered 1983–84.

T 10:10–12:05, R 10:10–12:05, R 2:30–4:25.

D. Barr

A critical analysis of the meaning of help in American society from the perspective of power, alienation, sexism, and racism.]

**417 The Politics of Power in the Human**

**Services** Spring. 3 credits. Prerequisites: permission of instructor and HSS 416 or 370 or equivalent courses.

T 1:25–2:15, R 12:20–2:15. D. Barr.

The framework of the course will take an analytical world view with some understanding of a capitalist political economy and the historically colonial

relationship between the American ruling class and peoples of color, the poor, and the powerless. In addition, the course will analyze the effects of these structural and historical facts on people's lives today. The relationship between a classed, racist, and sexist society and the human services will also be included by exploring the nature of empowerment. The course will focus systematically on both the micro- and macrolevels.

**421 Aging and the Human Services** Spring.

3 credits. Limited to 30 students. Prerequisite: a course in human development, sociology, or psychology. S-U grades optional.

T R 2:30–4. H. Burris.

The roles and status of the elderly will be examined in relationship to programs and services that have evolved from the Older Americans Act and amendments.

**439 Program Planning in Community and Family-Life Education** Spring. 3 credits.

M W F 9:05. M. Minot.

Students analyze factors that influence program planning and change and apply principles of program development to plan for and with groups or individuals in programs with different purposes and organizational structures. Plans should reflect a knowledge of client; issues in the problem area; regulatory and legislative constraints; the philosophy of the specific program, organization, and of education; the psychology of learning; inter- and intraorganizational structures and cooperation; human and fiscal resources; and evaluation planning

**441 The Art of Teaching** Fall, weeks 1–7.

2 credits. Prerequisites: HSS 339 and 439. To be taken concurrently with HSS 442 and 443. May involve some expense for field visits.

T R 10:10–12:05, plus additional hours arranged during the week of independent study following student teaching. Staff.

An orientation for the student-teaching practicum. Major topics interrelated are classroom atmosphere, discipline, and management; evaluation of the teaching-learning processes in relation to personal goals and unit objectives; philosophy, creativity, and teaching techniques; professionalism. Selected materials for the student-teaching practicum are developed.

**442 Teaching Internship** Fall, student teaching

full-time, weeks 8–14. 6 credits. Prerequisites: HSS 339 and 439. To be taken concurrently with HSS 441 and 443. Transportation and off-campus living costs need to be planned for in advance. Living arrangements are determined by the student; expenses may or may not be more than on campus, depending on choices made.

M. Minot, A. McLennan.

Guided student-teaching experience with student assigned to cooperating public schools. Student teachers are required to live in the school communities and work under the guidance of local teachers and department faculty. Cooperating schools are located in different types of communities, represent a variety of organizational structures, and have comprehensive programs. Students should indicate their intent as early as possible to facilitate communication and scheduling.

**443 Critical Issues in Education** Fall, weeks 1–7. 3 credits. S-U grades optional except for HSS Option I students. No students are admitted to the class after the first session.

T R 2:30–4:25, plus one hour to be arranged.

D. Tobias.

An examination of current issues in education. Analysis of historical, philosophical, social, and political factors that affect these issues.

**[444 Career Environmental and Individual**

**Development** Spring, weeks 1–7. 2 credits. Limited to 25 students. S-U grades optional. No students are admitted to the class after the first session.

F 12:20–2:15. R. Babcock.



An analysis of how work, jobs, and careers relate to and shape the behavior of individuals. Topics include theories of occupational choice, job satisfaction, structure of the labor force, manpower projection, and career planning. The course provides opportunities for students to examine their own vocational aspirations. Emphasis is on how the helping professional deals with clients or students in preparing for, adjusting to, and maintaining jobs and careers.]

**446 Teaching for Reading Competence: A Content-Area Approach** Fall. 2 or 3 credits. S-U grades optional.

M 7:30–9:30 p.m. Staff.

The teaching of reading through various content areas. Intended for future educators and community-service professionals as well as those already working in these fields. The course focuses on the need for improvement in reading, evaluation of reading materials, teaching of reading skills basic to various content areas, and development of materials to be used in a setting appropriate for the student. Opportunity to use the materials in a field setting, formal or informal, may be arranged if desired. If fieldwork is selected, the cost of transportation to the field setting is to be provided by the student.

**452 Advanced Field Experience in Community and Family-Life Education** Spring. 2–6 credits. Course may be repeated with instructor's permission. Enrollment limited by availability of field placements. Prerequisites vary depending on the field placement; however, one of the following is required: HSS 339, 411, 439, 446, or 471, or Education 311. Permission of instructor required. Because field placements take time to arrange, it is important to contact instructor well in advance of course registration. S-U grades optional. Transportation to field sites must be provided by the student.

W 3:35, plus hours to be arranged for fieldwork. Staff.

Direct intervention with individuals, families, or groups in the community. Students will design and implement or assess an educational program within the framework of the referring agency, government, or business setting. Some examples of projects undertaken are teaching parenting skills to handicapped adults, developing preschool programs, teaching nutrition through school lunch programs, implementing and evaluating programs for the elderly, developing educational materials for specific organizations, working with cooperative extension programs, working with handicapped students, working with social service agencies. The seminar assists students in synthesizing and integrating field experience with theory.

**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. Microcounseling skills are taught using role playing and video feedback. Class content is integrated with concurrent supervised fieldwork. Placements are made in social agencies in Tompkins, Tioga, Chemung, Cortland, and Schuyler counties. Students are encouraged to provide their own transportation, but car pools will be arranged for those who cannot. The department reimburses transportation costs when funds are available, but students may have to pay their own expenses. Each student must have a current driver's license.

**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. D. Ritchie and staff.

**472 Social Work Practice II** Spring. 9 credits. Limited to 25 social work students. Prerequisite: grade of B– or better in HSS 471 and satisfactory performance in fieldwork.

M W 10:10–12:05; fieldwork, T R for 8 hours each day. C. Shapiro and staff.

**473 Senior Seminar in Social Work** Spring. 3 credits. Prerequisites: HSS 471–472. (HSS 472 may be taken concurrently.)

M 2:30–3:45, W 2:30–3:20. C. Shapiro.

Building on the junior-year practice courses, this seminar will integrate intermediate-level theory and practice content and examine recurring themes in professional practice.

**474 Introduction to Social Planning** Fall. 3 credits. Limited to sophomores, juniors, and seniors.

M W 3:35–4:50. A. Hahn.

The course will introduce students to planning concepts and processes. The demographic, geographic, economic, and public health components of planning will be discussed. The students will be given specific planning assignments and asked to work in planning teams.

**475 Social Policy** Spring. 3 credits. Prerequisites: HSS 370 or Government 111 or Sociology 141. S-U grades optional. Students should have field or work experience in a human-service program before or while taking this course.

M W F 9:05. 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.

## 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).**

**600 Special Problems for Graduate Students**

Fall or spring. Credits to be arranged. For students recommended by their chairperson and approved by the instructor in charge for independent advanced work. S-U grades optional.

Department faculty.

**650 Teaching Human Services in Higher Education** Fall. 3 credits. S-U grades optional.

M W 11:15, plus 1 hour to be arranged.

A. McLennan.

Basic strategies for planning and implementing instruction in human services in higher education—for example, in-service, training programs, and two- and four-year colleges. Types of issues examined by researchers include variables involved in modes of learning, structure of content, and instructional settings. Emphasizes conceptualizing the teaching-learning process. Students are expected to develop instructional plans related to interests in the human services and to develop a repertoire of teaching skills through professional sequences in microteaching, classroom teaching, or both.

**651 Adult Development and the Provision of Human Services** Spring. 3 credits. S-U grades optional.

W 7:30–10:30 p.m. H. Burris.

Provides a survey of theories of adult development. Forces affecting the various periods, stages, passages, life tasks, or roles related to the adult's life cycle are examined. Biological factors, interpersonal relationships, social and cultural influences, and historical events are examined in relationship to perspectives on adult development. Opportunity for an empirical investigation of an adult population

is provided. Implications from theories and student-collected data are examined in relationship to the provision of human services programs.

**652 Preparing Professionals in the Human Services** Spring. 3 credits. S-U grades optional.

M W F 11:15. M. Minot.

The student analyzes the assumptions and concepts that underlie preprofessional and continuing professional education for volunteers, paraprofessionals, and professionals in the human services (for example, adult and continuing education, health, home economics, and social work education). A variety of preservice and in-service programs will be analyzed in terms of goals, means of implementation, and evaluation. Factors that influence programs are examined, including educational setting, licensure, accreditation, legislation, evaluation of performance. Students have opportunities to participate in educational programs in human service professions and community education. Students may develop or modify a model for providing professional education at the preservice or in-service levels.

**653 Consulting and Supervisory Roles in Human Services** Fall. 3 credits. S-U grades optional.

Offered alternate years.

M. Minot.

Analysis of theories and practices of consulting and supervision and their application in higher education and in human service agencies at the national, state, and local levels. Students make observations and apply consulting and supervisory skills in settings related to their professional goals.

**[654 Administration of Human Service Programs in Higher Education** Spring. 3 credits. S-U grades optional. Offered alternate years. Not offered 1983–84; next offered 1984–85.

W 1:25–4:25. Staff.

Issues that confront administrators of higher education and continuing professional education in the human services are analyzed: policy in higher education, student selection and retention, program development, program evaluation, accreditation, finance, professional staff development. Issues are developed by resource persons in higher education.]

**660 Public Policy and Program Planning in Human Services** Fall. 3 credits. S-U grades optional.

M W 11:15–12:30. I. Lazar.

A review of 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.

**661 Designing and Implementing Human Service Programs** Spring. 3 credits. S-U grades optional.

M 2:30–4:30, W 2:30–3:30. I. Lazar.

A review of issues in the translation of research, resources, and policy in education, health, and social welfare services into programs for service to communities and individuals. The course includes issues in need analysis, organizational structure, staffing, budget preparation, fund raising, and community-auspice development, as well as internally based program evaluation, administration, and change in the context of design and implementation.

**664 The Intergovernmental System and Human Service Program Planning** Fall. 3 credits S-U grades optional.

T R 3:35–5. J. Ziegler.

An in-depth review of intergovernmental systems in America and their relevance to the formulation of human service policy and programs. Issues of decision making, fiscal arrangements, and public and private sector interactions are explored as they are affected by intergovernmental relationships. The course provides students with an analytic framework for understanding these and other issues that review the relationships within and between various governmental levels.

**690 Measurement for Program Evaluation and Research** Fall. 3 credits.

T R 10:10–11:25. Staff.

This 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 methods of data collection, including interviewing strategies, testing, self-report, observation and content analysis, and data coding. Attention is given to issues such as ethical and managerial concerns that arise in applied settings.

**691 Program Evaluation and Research Design**

Spring. 3 credits. Prerequisite: introductory statistics course strongly recommended.

T R 2:30–3:45. W. Trochim.

Introduction to the theory of research design and its application to the evaluation of human service programs. Major topics include experimental, quasi-experimental, cross-sectional, and exploratory research designs; basic sampling theory; and the use of qualitative and quantitative methods. 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. Skills covered include stating and testing hypothesis, critical analysis of research reports, computer simulation, and development of a research proposal.

**692–693 Program Evaluation In Theory and Practice** 692, fall; 693, spring. 8 credits.

Prerequisites for HSS 692: 690 and 691, or permission of instructor. Prerequisite for HSS 693: 692. Students must register for both semesters. Offered alternate years.

C. McClintock.

A 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 the evaluation, ethics, methods of data collection, data processing, and strategies for analysis and feedback of results).

**[695 Strategies for Policy and Program**

**Evaluation** Fall. 3 credits. Prerequisites: HSS 690 and 694 or equivalent. Offered alternate years. Not offered 1983–84; next offered 1984–85.

Hours to be arranged. Staff.

This course examines a wide range of approaches to the evaluation of policies and programs in the human services. Traditional social science methods are reviewed as well as investigative and evaluative methods from other disciplines (e.g., auditing, law, history, criminology, philosophy). Analysis of the common and divergent tactics among different approaches to evaluation will be used to judge the appropriateness of a given strategy for a particular type of setting.]

**696 Qualitative Methods for Program Evaluation** Spring. 3 credits. Prerequisites: HSS 690 and 694 or equivalent

M W F 10:10. Staff.

This course explores the issues related to qualitative research methodology and the evaluation of human service programs. Topics include the underlying epistemological assumptions, questions of entry into setting, data collection, data analysis, confidentiality of participants, and the ethics of qualitative research approaches. It is the aim of the course to delineate those settings and researchable questions where such a methodology is or is not appropriate, as well as the benefits and limitations inherent in employing it.

**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 level in positions consistent with student 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.

**790 Advanced Seminar in Program Evaluation**

Spring. 3 credits. S-U grades optional. Prerequisite: permission of instructor.

Hours to be arranged. B. Trochim.

Intended for students with competence in program planning and program evaluation (equivalent to at least one course of the HSS 660 series and three of the HSS 690 series) plus 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 these areas.

**899 Master's Thesis and Research**

Fall and spring. Credit to be arranged. Prerequisite: permission of the chairperson of the graduate committee and the instructor. S-U grades optional.

Hours to be arranged. Department graduate faculty.

**999 Doctoral Thesis and Research**

Fall and spring. Credit to be arranged. Prerequisite: permission of the chairperson of the graduate committee and the instructor. S-U grades optional.

Hours to be arranged. Department graduate faculty.

**Topical Seminars and Practicums**

Seminars and practicums, offered irregularly, based on 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.

**610 Seminar in Adult and Community Education**

Topics include citizen participation, educational outreach for adults, postsecondary education, and cross-cultural programs.

**611 Seminar in Home Economics Education**

Topics include history and philosophy, legislation and policy, research, ecological approaches to programming, and secondary education programs.

**612 Seminar in Social Welfare Services**

Topics include services to children, aging, families, income-maintenance programs and reforms, and corrections.

**613 Seminar in Health and Mental Health Services**

Topics include alcohol and drug problems, developments in health and mental health policy and planning, and community mental health services.

**658 Practicum in Higher Education in Human Services**

Activities include college teaching, in-service education, and other efforts related to the preparation of professionals in the human services

**659 Seminar in Higher Education in Human Services**

Topics include professional versus agency belief systems, teacher education, developments in higher education in the human services. Two or more human services are examined.

**668 Practicum in Program Planning and Development**

Activities include preparing plans, organizational change, and developing resources and community support.

**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.

**698 Practicum in Program Evaluation and Evaluative Research**

Activities include performing policy and agency evaluations, needs assessments, and research studies related to evaluation of programs.

**699 Seminar in Program Evaluation and Evaluative Research**

Topics include sunset legislation; planning for evaluation, utilization, methodological and conceptual developments; social science; and public policy. Two or more human services are examined.

**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.

**503 Groups and Organizations** Spring. 3 credits. Registration through the Division of Extramural Courses only.

Hours to be arranged. Staff.

A course in the social psychology of small groups and human service organizations. Study of group processes includes self-perception and interpersonal perception roles, norms, communication, power, and leadership. Students apply what has been learned about small groups to the study of issues in human service organizations.

**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.

**529 Research Design and Analysis** Summer. 3 credits. Registration through the Division of Extramural Courses only.

Hours to be arranged. Staff.  
Students should develop skill in analyzing and evaluating research reports. Readings, exercises, and periodic assignments focus on stating hypotheses, designing studies to test hypotheses, measuring variables, and interpreting findings.

**537 Social Welfare as a Social Institution** Fall. 3 credits. Registration through the Division of Extramural Courses only.

Hours to be arranged. Staff.  
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 programs. Basic issues in welfare are discussed in the context of present program design, public concerns, and the interrelationships and support of services in the community.

**546 Ecological Determinants of Behavior** Summer. 3 credits. Registration through the Division of Extramural Courses only.

Hours to be arranged. Staff.  
An introductory course concerning the identification of some major determinants of human behavior and their interaction. Students examine (through readings, papers, and discussion) different "ecological perspectives" of behavior and attempt to integrate these perspectives into a human services framework. For example, the implications of an ecological perspective for the planning and delivery of services are emphasized.

**574 Program Development in Social Services** Spring. 3 credits. Registration through the Division of Extramural Courses only.

Hours to be arranged. Staff.  
Deals with program development in the fields in which students are or will be working.

**575 Organization and Structure for Delivery of Social Services** Spring. 3 credits. Registration through the Division of Extramural Courses only.

Hours to be arranged. Staff.  
A framework for assessing and understanding the range of issues posed in the current organization and delivery of various social services. Concepts of social policy analysis are used to evaluate different social service systems, new models of service delivery being developed, and proposals for change being made at national, state, and local levels. Students should have some form of field or work experience in human services prior to, or concurrent with, this course.

**580 Principles and Practice of Public Health I**

Fall. 4 credits. S-U grades optional.

M W F 10:10. J. Ford.  
Attention is given to assumptions and concepts that underlie social responsibility for health. Reviews of human behavior in the social environment are presented in relation to health and disease and the rationale for various public health policies and programs. Case studies are used to apply principles and concepts from readings and lectures.

**581 Principles and Practice of Public Health II**

Spring. 4 credits. S-U grades optional.

M W F 10:10. J. Ford.  
Analysis of strategies to improve the organization and delivery of public health services. Methods of accomplishing behavioral and organizational change to improve health, and implications for health planning, administration, and program evaluation are explored. Case studies are used to apply principles and concepts from readings and lectures.

## Nutritional Sciences Courses

See course descriptions under the Division of Nutritional Sciences, pp. 335-339.

## Faculty Roster

Allen, Josephine A., Ph.D., U. of Michigan. Asst. Prof., Human Service Studies  
Anderson, Carol L., Ph.D., Iowa State U. Assoc. Prof., Human Development and Family Studies  
Babcock, Robert J., Ed.D., Cornell U. Assoc. Prof., Human Service Studies  
Barr, Donald J., Ph.D., Indiana U. Assoc. Prof., Human Service Studies  
Basseches, Michael A., Ph.D., Harvard U. Asst. Prof., Human Development and Family Studies  
Bayer, Helen T., Ph.D., Cornell U. Prof., Human Development and Family Studies  
Becker, Franklin D., Ph.D., U. of California at Davis. Assoc. Prof., Design and Environmental Analysis  
Biesdorf, Heinz B., Ph.D., U. of Innsbruck (Austria). Prof., Consumer Economics and Housing  
Boegly, Carolyn, M.S., U. of Wisconsin. Assoc. Prof., Cooperative Extension  
Boyd, D. Michael, B.A., U. of North Iowa. Assoc. Prof., Design and Environmental Analysis  
Brittain, W. Lambert, Ed.D., Penn State U. Prof., Human Development and Family Studies  
Bronfenbrenner, Urie, Ph.D., U. of Michigan. Jacob Gould Schurman Professor, Human Development and Family Studies  
Brumberg, Joan J., Ph.D., U. of Virginia. Asst. Prof., Human Development and Family Studies  
Bryant, W. Keith, Ph.D., Michigan State U. Prof., Consumer Economics and Housing  
Burris, Helen W., Ph.D., Iowa State U. Asst. Prof., Human Service Studies  
Bushnell, Allen R., M.F.A., Cranbrook Acad. of Art. Assoc. Prof., Design and Environmental Analysis  
Cawley, Charles, Ph.D., U. of Texas at Dallas. Asst. Prof., Design and Environmental Analysis  
Ceci, Stephen J., Ph.D., U. of Exeter (England). Asst. Prof., Human Development and Family Studies  
Chi, Peter S., Ph.D., Brown U. Assoc. Prof., Consumer Economics and Housing  
Chu, Chih-Chang, Ph.D., Florida State U. Asst. Prof., Design and Environmental Analysis  
Clemhout, Simone, Ph.D., Massachusetts Inst. of Technology. Prof., Consumer Economics and Housing  
Cochran, Moncrieff M., Ph.D., U. of Michigan. Assoc. Prof., Human Development and Family Studies  
Condry, John C., Jr., Ph.D., U. of California at Los Angeles. Assoc. Prof., Human Development and Family Studies  
Cornelius, Steven W., Ph.D., Pennsylvania State U. Asst. Prof., Human Development and Family Studies  
Davey, Alice J., Ph.D., Michigan State U. Prof., Consumer Economics and Housing  
Deshler, John D., Ed.D., U. of California at Los Angeles. Assoc. Prof., Human Service Studies  
Doris, John L., Ph.D., Yale U. Prof., Human Development and Family Studies  
Elder, Glenn H., Ph.D., U. of Chicago. Prof., Human Development and Family Studies  
Eshelman, Paul E., M.F.A., U. of Illinois. Asst. Prof., Design and Environmental Analysis  
Ford, John L., Ph.D., U. of Michigan. Assoc. 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  
Hahn, Alan J., Ph.D., Indiana U. Assoc. Prof., Human Service Studies  
Hall, Bruce F., Ph.D., U. of California at Berkeley. Asst. Prof., Consumer Economics and Housing  
Hamilton, Stephen F., Ed.D., Harvard U. Asst. Prof., Human Development and Family Studies

Harding, John S., Ph.D., Harvard U. Prof., Human Development and Family Studies  
Heck, Ramona, Ph.D., Purdue U. Asst. Prof., Consumer Economics and Housing  
Hogarth, Jeanne M., Ph.D., Ohio State U. Asst. Prof., Consumer Economics and Housing  
Kain, Edward L., Ph.D., U. of North Carolina. Asst. Prof., Human Development and Family Studies  
Koslowski, Barbara, Ed.D., Harvard U. Assoc. Prof., Human Development and Family Studies  
Lazar, Irving, Ph.D., Columbia U. Prof., Human Service Studies  
Lea, Michael J., Ph.D., U. of North Carolina. Asst. Prof., Consumer Economics and Housing  
Lee, Lee C., Ph.D., Ohio State U. Assoc. Prof., Human Development and Family Studies  
Lemley, Ann T., Ph.D., Cornell U. Asst. Prof., Design and Environmental Analysis  
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. Assoc. Prof., Human Service Studies  
McLean, W. Jean, M.S., Michigan State U. Prof., Design and Environmental Analysis  
McLennan, Claire A., Ph.D., Texas Tech U. Asst. Prof., Human Service Studies  
Mankowski, Leonard E., M.A., Cornell U. Asst. Prof., Design and Environmental Analysis  
Markovich, Nicholas C., M.Arch., U. of New Mexico. Asst. Prof., Design and Environmental Analysis  
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, Ph.D., Cornell U. Prof., Human Service Studies  
Moen, Phyllis, Ph.D., U. of Minnesota. Asst. Prof., Human Development and Family Studies  
Mueller, B. Jeanne, Ph.D., U. of Wisconsin. Prof., Human Service Studies  
Nelson, Helen Y., Ph.D., U. of Minnesota. Prof., Human Service Studies  
Noble, Lucinda A., Ph.D., U. of North Carolina. Prof., Human Service Studies  
Obendorf, Sharon, Ph.D., Cornell U. Assoc. Prof., Design and Environmental Analysis  
Ostrander, Edward R., Ph.D., U. of Illinois. Assoc. Prof., Design and Environmental Analysis  
Pollack, Patricia, Ph.D., Syracuse U. Asst. Prof., Consumer Economics and Housing  
Potts, Marion, Ph.D., Penn State U. Prof., Human Development and Family Studies  
Purchase, Mary E., Ph.D., Iowa State U. Prof., Design and Environmental Analysis  
Reed, Clarence H., M.Ed., Louisiana State U. Adj. Asst. Prof., Human Service Studies  
Ricciuti, Henry N., Ph.D., Fordham U. Prof., Human Development and Family Studies  
Ritchie, Dennis, Ph.D., Syracuse U. Asst. Prof., Human Service Studies  
Robinson, Jean R., Ph.D., Radcliffe C. Prof., Consumer Economics and Housing  
Saltford, Nancy C., Ph.D., Purdue U. Assoc. Prof., Design and Environmental Analysis  
Savin-Williams, Richard C., Ph.D., U. of Chicago. Asst. Prof., Human Development and Family Studies  
Schoggen, Phil, Ph.D., U. of Kansas. Prof., Human Development and Family Studies  
Schwartz, Peter, Ph.D., N. Carolina State U. Asst. Prof., Design and Environmental Analysis  
Shapiro, Constance H., Ph.D., Cornell U. Asst. Prof., Human Service Studies  
Shlay, Anne B., Ph.D., U. of Massachusetts. Asst. Prof., Consumer Economics and Housing  
Sims, William R., Ph.D., Massachusetts Inst. of Technology. Prof., Design and Environmental Analysis  
Sloan, Gary D., Ph.D., North Carolina State U. Asst. Prof., Design and Environmental Analysis  
Straight, Clara J., M.F.A., U. of Colorado. 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. Asst. Prof., Human Service Studies
- Walker, Elaine, Ph.D., U. of Missouri. Asst. Prof., Human Development and Family Studies
- Watkins, Susan M., M.S., Pennsylvania State U. Assoc. Prof., Design and Environmental Analysis
- White, M. Vivian, Ph.D., U. of Leeds (England). Assoc. Prof., Design and Environmental Analysis
- Yerka, Bettie L., Ph.D., Syracuse U. Assoc. Prof., Human Service Studies
- Ziegert, Beate I. E., B.A., U. of Toronto (Canada). Asst. Prof., Design and Environmental Analysis
- Ziegler, Jerome M., M.A., U. of Chicago. Prof., Human Service Studies
- Zober, Mark, Ph.D., Brandeis U. Adj. Asst. Prof., Human Service Studies
- Zorn, Peter M., U. of California at Davis. Asst. Prof., Consumer Economics and Housing

# New York State School of Industrial and Labor Relations

## Administration

Charles M. Rehmus, dean

Lois S. Gray, associate dean, extension and public affairs

Robert E. Doherty, associate dean, academic affairs

Frank B. Miller, director, Office of Resident Instruction

Shirley Harper, librarian

Ronald G. Ehrenberg, director, research

Frances Benson, director, publications

George M. Calvert, director of budget

Lawrence K. Williams, graduate field representative

Donald E. Cullen, editor, *Industrial and Labor Relations Review*

## Degree Program

Industrial and Labor Relations

Degree  
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 six hundred undergraduates and approximately one hundred graduate students.

The school's home is a unified complex of classroom buildings, library, and administrative and faculty offices clustered around two courtyards. Daily classroom activities and other school events provide many opportunities for ILR students and faculty to interact. Students are members of the larger Cornell community and participate 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. Enrollment of women has been increasing in recent years, and recent entering classes have been 50 percent women.

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 University facilities.

The school operates in four areas: (1) undergraduate and graduate resident instruction, (2) extension and public service, (3) research, and (4) publications. It provides instruction to young people on campus 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** studies the history of the labor movement and collective bargaining in the United States, as well as the role of government in labor relations.

**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** is concerned with industrial and labor relations developments in other countries, both industrialized and less developed.

**Labor Economics** deals with analysis of the labor force, labor markets, wages and related terms of employment, income distribution, unemployment, health and safety in industry, and retirement.

**Organizational Behavior** investigates human behavior in organizations through psychology and sociology. Courses treat individual human behavior, organizations in society, and industrial society.

**Personnel and Human Resource Studies** examines the efforts of work organizations to recruit, train, compensate, and manage their members, as well as public policy and programs concerning employability, employment, and income of workers.

A full list of required and elective courses is available from the Office of Resident Instruction, 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 Resident Instruction

Staff members from the Office of Resident Instruction, 101 Ives Hall, work closely with faculty and faculty committees to administer degree programs for the school. The office's responsibilities include the admitting and orienting of new students, maintaining students' personal and academic records, administering the faculty advisory system and academic standards, counseling students on personal and academic problems, and administering the school's financial aid programs. The office also provides a career counseling service and works closely with seniors who are planning graduate study.

### Counseling and Advising

Entering freshmen will be provided advising on orientation, academic procedures, and course registration throughout the first year by counselors in the Office of Resident Instruction.

Each of the school's academic departments names one or more of its members to serve as advisers for students who wish to consult with them regarding course selection, 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 Resident Instruction.

### Minority Students

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

special programs is to aid in increasing representation of state residents from minority groups historically underrepresented in higher education. Participation is also available to those residing outside New York State. For details, prospective students should consult the section Minority and Special Opportunity Programs in *Introducing Cornell* or contact the Office of Admissions.

## Study Options

Several study options are open to ILR undergraduates, making it possible to tailor a program to fit specific needs.

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 Cornell's Graduate School of Business and Public Administration (B&PA), earning their bachelor's degree in ILR and a master's degree in B&PA 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, or as much as a year of study at a foreign university. Others opt for internships that give them practical field experience, such as a summer in New York City's Office of Collective Bargaining or a term doing research for the New York State Senate Committee on Labor in Albany.

For more information, see Special Academic Programs, which follows the next section.

A number of ILR courses deal directly with today's problems and involve fieldwork in the Ithaca area, elsewhere in New York State, and even in foreign countries. These courses take some students to the state legislature in Albany or to community-action groups. Others may work in prisons, institutions, or school districts.

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

Students who want to study at another institution for a semester or for a year and receive credit toward their undergraduate degree may petition to study in absentia. This permits students to study at a foreign university or at another American school that offers a program unavailable at Cornell. Eligibility requires good standing and approval of study plans by the director of resident instruction. 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 Resident Instruction if the course is more appropriate as an 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 Resident Instruction. Counselors will assist students in petitioning for a leave of absence.

## Requirements for Graduation

To earn the Cornell Bachelor of Science degree in industrial and labor relations, the student needs to successfully complete 120 credits. Normally, this requires eight terms, although some students finish their studies in a shorter time.



## Required Courses

(51 credits)

The current 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
<b>Freshman year</b>		
Freshman Seminars*	6	Fall and spring
Econ 101–102, Micro, Macro Economics*	6	Fall and spring
Psych 101, Introduction to Psychology*	3	Fall
I&LR 100–101, History of Industrial Relations in the United States	6	Fall and spring
I&LR 140, Development of Economic Institutions	3	Spring
I&LR 120–121, Macro, Micro Organizational Behavior and Analysis	6	Fall and spring
Physical education	0	Fall and spring
<b>Sophomore year</b>		
I&LR 201, Labor Relations Law and Legislation	3	Fall
I&LR 240, Economics of Wages and Employment	3	Fall
I&LR 210–211, Statistics	6	Fall and spring
I&LR 200, Collective Bargaining	3	Spring†
I&LR 260, Personnel Management	3	Fall or spring
<b>Junior year</b>		
I&LR 340, Economic Security	3	Fall

## Elective Courses

(69 credits)

From the courses offered by the school, students must select a minimum of 30 credits of ILR elective courses. No more than 9 of these 30 credits may be satisfied by I&LR 499, Directed Studies, or ILR 497–498, Internships, or ILR 495, Honors Program.

The remaining 39 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 Graduate School of Business and Public Administration; 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 Resident Instruction in order 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 approved explanation for absence from class may occasionally be granted in advance of the expected absence by the Office of Resident Instruction. 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 record of clinic or infirmary treatment;
- 3) serious illness or death in immediate family;
- 4) other circumstances beyond the student's control.

A request for approval of an absence should, when possible, be made to the Office of Resident Instruction *before the date of expected absence*. A reported and approved explanation of 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 Resident Instruction of any problems they have meeting course requirements.

## Academic Standing and Grades

### Academic Integrity

In 1977 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. Copies are available from the Office of Resident Instruction, 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 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.

## 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 courses.

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.

## Incomplete Grades

An *Incomplete* (INC) is a grade 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 an *Incomplete* grade 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 an *Incomplete*. An *Incomplete* grade not made up within this time automatically becomes an F.

## Special Academic Programs

In order 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 Resident Instruction. Counselors will explore the program with students to help them decide if it suits their interests.

## Dual Registration in Business and Public Administration

Dual informal registration in the School of Business and Public Administration (B&PA) leads to a Bachelor of Science degree in industrial and labor relations and a master's degree in business and public

\*College of Arts and Sciences.

†May be postponed until fall of the junior year.

administration after five years of study and is open to students who meet the requirements of the Graduate School of Business and Public Administration.

Early planning by each student, preferably in the sophomore year, is desirable to ensure that B&PA expectations and the ILR curriculum requirements are fulfilled. Students interested in the very limited and selective program of the Graduate School of Business and Public Administration should contact the Admissions Office, 319 Malott Hall, and a counselor at the Office of Resident Instruction.

### 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 Resident Instruction after their freshman year.

### Semester off Campus

For the past few years the semester-off-campus 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 small 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 and seminars drawing on fieldwork experience with employers, labor organizations, and government agencies. More information about this program is available from the Office of Resident Instruction.

### Junior Year Abroad

A few students each year are granted permission to register in absentia and continue their studies at a foreign university. Although the school does not have a fixed program for foreign study, students who have studied abroad generally receive some credit for their course work and have found it a very rewarding experience. Students may attend a foreign university of their choosing, but guidance in finding and selecting programs is available from the Office of Resident Instruction and from the Career Center, 14 East Avenue.

## Collective Bargaining, Labor Law, and Labor History

D. Lipsky, chairman; G. Brooks, J. Burton, D. Cullen, C. Daniel, R. Doherty, R. Donovan, M. Gold, J. Gross, K. Hanslowe, G. Korman, R. Lieberwitz, L. Mishel, J. Morris, A. Nash, C. Rehms, P. Ross, N. Salvatore, R. Seeber, J. Windmuller

### 100 History of Industrial Relations in the United States

Fall or spring. 3 credits.  
C. Daniel, G. Korman, J. Morris, N. Salvatore.  
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.

### 101 Special Studies in the History of Industrial Relations in the United States

Fall or spring. 3 credits. Prerequisite: I&LR 100 for ILR students; no prerequisite for out-of-college students.  
C. Daniel, G. Korman, J. Morris, N. Salvatore.  
Several instructors offer undergraduate classes, each on a particular aspect of the history of industrial

relations in the United States. Students choose among classes that may vary from year to year and cover topics such as industrial relations in the age of Jackson and in other periods of American history such as the Gilded Age, the two World Wars, or the Great Depression; the role of industry and organized labor in politics; and radicalism and dissent in the American labor movement.

### 200 Collective Bargaining

Fall or spring. 3 credits.  
J. Burton, D. Cullen, D. Lipsky, L. Mishel, P. Ross, R. Seeber.

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.

### 201 Labor Relations Law and Legislation

Fall or spring. 3 credits.

M. Gold, J. Gross, K. Hanslowe, R. Lieberwitz.  
A survey of the law governing labor relations. The legal framework in which the collective bargaining relationship is established and 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.

### 301 Labor Union Administration

Fall. 3 credits.

Prerequisites: I&LR 100 and 201.  
G. Brooks, C. Daniel, R. Seeber.  
A review of the operations of American unions, including a general theoretical framework, but with major emphasis on practical operating experience. Topics include 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 functions of organizing; negotiating; contract administration; and the effect of the Landrum-Griffin Act.

### 303 Research Seminar in the Social History of American Workers

Fall. 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.

### 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, G. Korman, J. Morris.  
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.

### 305 Labor in Industrializing America: 1865-1920

Fall. 3 credits. Prerequisite: I&LR 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.

### 306 Research Seminar in the American Labor Movement and Politics

Fall or spring. 3 credits.  
Prerequisite: I&LR 101. Limited to upperclass students who have demonstrated ability to undertake

independent work and who have received permission of the instructor.

J. Morris.  
Students choose a research topic, using any disciplinary approach (such as law, history, behavioral or political science), within the subject-matter area. Group meetings are devoted to (1) discussion in depth of special problems such as compulsory membership and union political spending, the adequacy of the law governing union political action, and labor's partisan ties with the Democratic party, and (2) exchange of research problems and reports. Some time normally devoted to group meetings is scheduled for individual consultations.

### 307 Industrial Relations Biographies

Fall. 4 credits. Limited to juniors and seniors. Prerequisite: permission of instructor.

J. Morris.  
A study of American industrial relations history through the lives of some of the outstanding people who have helped make it—men and women of business, government, and the law, as well as leaders of labor and their allies among the intellectuals. While economic forces, institutional developments, and social values are important in shaping history, so also is the role of individual personality. Readings and discussions focus on biographies and autobiographies, supplemented in some cases with tapes and films. There will be written assignments, but emphasis will be on the weekly discussion.

### 380 Famous Trials in American Labor History

Spring. 4 credits. Limited to juniors and seniors. Prerequisites: I&LR 100 and permission of instructor.

J. Morris.  
Some of the famous criminal trials involving union leaders, radicals, and ordinary workmen who were unknown before they faced the bar. Among the defendants or cases which may be considered (charges range from fraud to murder) are Jimmy Hoffa, Sacco and Vanzetti, Mooney and Billings, the Centralia tragedy and trial, the great IWW trials of World War I, the case of Joe Hill, the Haymarket anarchists, the trial and execution of the Molly Maguire leaders, and the triple case of Moyer, Haywood, and Pettibone.

### 381 Jewish Workers in Europe and America, 1789-1948

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.

### 400 Union Organizing

Spring, 7 weeks only. 2 credits.  
2 meetings each week. D. Cullen, R. Donovan.  
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 and a research paper.

### 403 The Law of Workers' Compensation

Fall, 7 weeks only. 2 credits.  
J. Burton.  
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.

### 404 Contract Administration

Fall, weeks 1-7. 2 credits. Prerequisites: undergraduates, I&LR 200 and 201; graduate students, I&LR 500 and 501.  
R. Seeber.  
This course bridges the gap between I&LR 200 (500), Collective Bargaining, and I&LR 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 to 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.

**406 History of the Black Worker in the United States** Fall. 3 credits. Prerequisite: I&LR 100.

J. Gross.  
 Introduced 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.

**407 Contemporary Trade Union Movement**

Spring. 3 credits. Prerequisites: I&LR 100 or 502 or permission of instructor.

C. Daniel.  
 An examination of the contemporary history, administration, policies, and problems of American trade unions. Each semester the course focuses on particular aspects of the labor movements.

**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; (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 chairperson, and a representative of the Academic Standards Committee.

**497-498 Internship** Fall or spring. 3 and 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 Resident Instruction 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.

**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 Resident Instruction at the time of course registration to arrange for formal submission of their projects for approval by the Academic Standards Committee.

**500 Collective Bargaining** Fall or spring.

3 credits. Open only to graduate students. Recommended: I&LR 501 taken previously or concurrently.

D. Cullen, D. Lipsky, L. Mishel, R. Seeber.  
 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.

**501 Labor Relations Law and Legislation** Fall or spring. 3 credits.

M. Gold, J. Gross, K. Hanslowe, R. Lieberwitz.  
 A survey and analysis of the labor relations law that examines the extent to which the law protects and regulates concerted action by employees in the labor market. The legal framework within which the collective bargaining takes place is considered and analyzed. Problems of the administration and enforcement of the collective agreement are considered, as are problems of protecting the individual member-employee rights with the union.

**502 Labor Union History and Administration** Fall or spring. 3 credits.

C. Daniel, G. Korman, J. Morris, R. Seeber.  
 A presentation of the history of labor in America, with emphasis on post-Civil War trade union development. Includes an analysis of the structure and functions of the various units of labor organization ranging from the national federation to the local union, and some consideration of special problems and activities such as democracy in trade unions, and health and welfare plans, as well as of various types of unions, such as those in construction, maritime trades, entertainment, transportation, and basic industry.

**600 Advanced Seminar in Labor Arbitration**

Spring. 3 credits. Limited to juniors, seniors and graduate students. Prerequisite: I&LR 602 or equivalent and permission of instructor.

J. Gross, K. Hanslowe.  
 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.

**601 The Bargaining Process: Theory and Practice** Fall. 3 credits. Prerequisite: I&LR 200 or 500

D. Lipsky.  
 Focus is on theories of the bargaining process, including economic, behavioral, game-theoretic, political, and social-psychological approaches to the bargaining problem. Will consider union wage policy, particularly the formulation of union goals in bargaining. Union and management preparation for negotiations, bargaining strategies and tactics, and bargaining power are some of the facets of the bargaining process that will be discussed. Attempts at empirical verification of various bargaining theories will also be considered. Theoretical and analytical principles will be developed in assigned readings and class discussions. The application and practical relevance of these principles will be explored through mock negotiations and other exercises.

**602 Arbitration** Fall or spring. 4 credits. Limited to 21 students. Prerequisites: undergraduates, I&LR 200; graduate students, I&LR 500.

J. Gross, C. Rehmus.  
 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.

**603 Governmental Adjustment of Labor Disputes**

Fall or spring. 4 credits. Prerequisites: undergraduates, I&LR 200; graduate students, I&LR 500.

D. Cullen.  
 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.

**604 Readings in the Literature of American Radicalism and Dissent**

Fall or spring. 3 credits. Limited to seniors and graduate students.  
 Each term, concentration is on a different historical aspect of American radicalism and dissent. Some examples of areas and writers who might be selected for study are agrarian reform—Thomas Skidmore, George Henry Evans, and Ignatius Donnelly; anarchism—Josiah Warren, William D. Haywood, Emma Goldman, and Paul Goodman; communism—John Reed, Jay Lovestone, and William Z. Foster; economic dissent—Henry George, Thorstein Veblen, and Francis Everett Townsend; equal rights for blacks and black nationalism—William E. B. DuBois and Marcus Garvey.

**605 Readings in the History of Industrial Relations in the United States** Fall. 3 credits.

Limited to seniors and graduate students. Prerequisites: seniors, I&LR 100 and 101; graduate students, I&LR 502.

C. Daniel, G. Korman, J. Morris.  
 A seminar covering, intensively and in historical sequence, key documents, studies, legislative investigations, and memoirs concerning American industrial relations systems. Primarily designed to aid students in orienting themselves systematically and thoroughly in the field. Among the authors and reports covered are E. P. Thompson, John R. Commons, Norman Ware, Lloyd Ullman, the Abram Hewitt hearings, the Henry W. Blair hearings, the United States Industrial Commission, Philip Taft, Paul F. Brissenden, and the United States Commission on Industrial Relations.

**606 Theories of Industrial Relations Systems**

Fall or spring. 3 credits. Limited to seniors and graduate students. Prerequisites: seniors, I&LR 100 and 101; graduate students, I&LR 502.

C. Daniel, G. Korman, or J. Morris.  
 An examination of the leading theories concerning the origins, forms, organization, administration, aims, functions, and methods of industrial relations systems. Among the theories studied are those formulated by Karl Marx, Mikhail Bakunin, Georges Sorel, Vladimir Lenin, Lujó Bretano, Beatrice and Sidney Webb, Herbert Croly, Antonio Gramsci, Selig Perlman, Frank Tannenbaum, the Guild Socialists, Karl Polanyi, Clark Kerr, Frederick Harbison, John Dunlop, and Charles A. Myers.

**607 Arbitration and Public Policy** Spring.

3 credits. Limited to 10 ILR students and 10 law students. Prerequisite: permission of instructor.

J. Gross, K. Hanslowe.  
 The impact of law and public policy on the arbitration of labor disputes in both the private and public sectors. Some of the topics covered include the law of arbitration, the scope of judicial review, the interaction between Title VII and arbitration, and

individual rights to due process in the handling of grievances. Students prepare briefs, argue cases, and write awards. As opportunity permits, students are invited to attend actual arbitration hearings and to write mock awards. Each student also writes a research paper on a topic within the general scope of the course and presents it in summary form to members of the seminar for criticism and evaluation.

**608 Special Topics in Collective Bargaining, Labor Law, and Legislation** Fall or spring.

3 credits. Prerequisites: undergraduates, I&LR 201; graduate students, I&LR 502.

Staff.

The areas of study are determined each semester by the instructor offering the seminar.

**680 Problems in Union Democracy** Fall or spring. 3 credits.

M. Gold, P. Ross.

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.

**681 Labor Relations Law** Spring. 3 credits.

Prerequisite: I&LR 201 or 501 or equivalent.

M. Gold.

An advanced course in labor law, concentrating on problems of administering the National Labor Relations Act; the Landrum-Griffin Act; Title VII of the Civil Rights Act of 1964, as amended; the Fair Labor Standards Act, as amended; the Equal Pay Act; the Age Discrimination in Employment Act; the Occupational Safety and Health Act; and state workers' compensation and unemployment insurance systems.

**682 Seminar in Labor Relations Law and Legislation** Fall or spring. 3 credits. Limited enrollment. Prerequisite: permission of instructor.

K. Hanslowe, R. Lieberwitz.

Legal problems in public employment and other areas of labor relations affecting the public interest.

**683 Special Topics in the History, Administration, and Theories of Industrial Relations** Fall or spring. 3 credits. Prerequisites: undergraduates, I&LR 100 and 101; graduate students, I&LR 502.

G. Brooks, C. Daniel, G. Korman, J. Morris, N. Salvatore.

The areas of study are determined each semester by the instructor offering the seminar.

**684 Employment Discrimination and the Law**

Fall or spring. 4 credits. Prerequisite: I&LR 201 or 501 or equivalent.

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.

**685 Collective Bargaining in Public Education**

Spring. 3 credits. Limited enrollment. Prerequisite: permission of instructor.

R. Doherty.

The seminar consists of a study of the legal, financial, administrative and educational problems raised by

collective bargaining in the public schools. Major attention will be directed at existing statutes covering the employment arrangement for public school employees, the content and the administration of collective agreements, the ideological postures of teacher organizations, and the resolution of negotiating impasses. Individual and group research projects will be required.

**686 Collective Bargaining in the Public Sector**

Fall or spring. 3 credits. Prerequisites:

undergraduates, I&LR 200 and 201; graduate students, I&LR 500 and 501.

J. Burton, R. Donovan, P. Ross, R. Seeber.

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.

**687 Current Issues in Collective Bargaining** Fall

or spring. 3 or 4 credits. Limited to 25 students.

Prerequisite: I&LR 200 or 500.

D. Cullen, D. Lipsky, P. Ross.

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.

**688 The Political Economy of Collective Bargaining** Fall. 3 credits. Prerequisites:

undergraduates, I&LR 200 and 240; graduate students, I&LR 500 and 540, or permission of instructor.

L. Mishel.

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. Examines both the economic outcomes of collective bargaining and current bargaining trends in a variety of industries. Topics include neoclassical and structural-institutionalist analyses of union power; the effect of unions on compensation, productivity, prices, and income inequality; union growth and strikes; pattern setting and bargaining structures; multinational and conglomerate corporate structures and collective bargaining; the decline of union bargaining power; unions and inflation; and concession bargaining. Approximately half the course is spent on case studies of collective bargaining in various industries (auto, steel, construction, etc.) in the private sector. A term paper is required. Topics are covered in a nonstatistical fashion.

**689 Labor Education** Spring. 3 credits. Limited to 15 students.

A. Nash.

An examination will be made of labor education, 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.

**703 Theory and Research in Collective Bargaining** Spring. 3 credits. Open to graduate

students who have had I&LR 500 and 723 or their equivalents. Recommended: a statistics course beyond the level of I&LR 510.

D. Lipsky, R. Seeber.

This is a second-level course in collective bargaining that builds on the institutional research covered in I&LR 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.

**705 The Economics of Collective Bargaining**

Spring. 3 credits. Prerequisites: undergraduates, I&LR 500; graduate students, I&LR 540 (or their equivalents) and an understanding of multiple regression analysis; or permission of instructor.

L. Mishel.

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. A tentative theoretical analysis 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, productivity, earnings inequality) are also evaluated. The effect of technology, corporate structures, and public policy on union bargaining power are outlined, and a number of case studies of collective bargaining in the private sector are reviewed. A term paper is required.

**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 I&LR 798 must be approved by the faculty member who will supervise the project.

**799 Directed Studies** Fall or spring. Credit to be arranged.

For individual research conducted under the direction of a member of the faculty.

**980 Workshop in Collective Bargaining, Labor Law, and Labor History** Fall and spring. 2 credits

Enrollment 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 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. McCarthy, chairman; I. Blumen, P. Velleman

**210 Statistics (Statistical Reasoning)** Fall or

spring. 3 credits. Not open to engineering or graduate students. Attendance at the first lab of the term is essential.

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 of the specialized courses on applications of statistics offered in various departments.

**211 Economic and Social Statistics** Spring

3 credits. Prerequisite: I&LR 210. Attendance at the first lab of the term is essential.

A continuation of I&LR 210. Application of statistical techniques to the quantitative aspects of social

studies. Students are taught to use the Minitab statistics package and use the computer throughout the course. Topics include statistical description and inference, multiple regression and correlation, index numbers, elements of time series analysis, and the design of sample surveys.

**310 Design of Sample Surveys** Spring. 3 credits. Prerequisite: one term of statistics.

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.

**311 Statistics II** Fall. 4 credits. Prerequisite: I&LR 210 or permission of instructor.

An intermediate, nonmathematical statistics course emphasizing the concepts associated with statistical methods. Includes a treatment of estimation and tests of hypotheses with reasons for choice of various methods and models. Application to problems involving percentages, means, variances, and correlation coefficients with an introduction to nonparametric methods, analysis of variance, and multiple regression and correlation.

**410 Techniques of Multivariate Analysis** Fall. 3 credits. Prerequisite: I&LR 311.

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 regression, correlation, principle components, multivariate tests on means, variances and covariances, relations between sets of variates, and discriminatory analysis.

**411 Statistical Analysis of Qualitative Data** Spring. 3 credits. Prerequisite: I&LR 311.

I. Blumen.  
An advanced undergraduate and beginning graduate course. Includes treatment of association between qualitative variates, paired comparisons, rank-order methods, and other nonparametric statistical techniques, including those related to chi-squared.

**499 Directed Studies** For description, see p. 322.

**510 Introductory Statistics for the Social Sciences** Fall or spring. 3 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.

**610 Seminar in Modern Data Analysis** Fall. 3 credits. Prerequisite: I&LR 311 or equivalent.

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 (Statistics and Biometry 416 may be taken concurrently), and some experience using a computer.

**712 Theory of Sampling** Fall. 3 credits.

Prerequisite: calculus and at least one semester of mathematical statistics.  
A companion course to I&LR 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.

**799 Directed Studies**

For description see p. 323.

## International and Comparative Labor Relations

J. Windmuller, chairman; M. G. Clark, G. Fields, W. Galenson

**330 Comparative Industrial Relations Systems I: Western Europe** Fall. 3 credits (1 additional credit may be arranged with the instructor). Open to juniors and seniors.

J. Windmuller.  
An introduction to contemporary industrial relations in several Western industrialized countries, including Britain, France, West Germany, and Sweden. The emphasis will be on trade unions, employers and their associations, collective bargaining, the role of government, and current policy issues.

**331 Comparative Industrial Relations Systems II: Eastern Europe, Japan, and the Third World** Spring. 3 credits (1 additional credit may be arranged with the instructor). Open to juniors and seniors.

J. Windmuller.  
A study of the industrial relations systems of less-developed countries and non-Western countries in various stages of economic development and in various political contexts, including Japan, the Soviet Union, Yugoslavia, India, and several others.

**332 Labor in Developing Economies** Spring. 3 credits.

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.

**430 European Labor History** Fall. 3 credits.

J. Windmuller.  
The development of trade unions in European countries, especially Great Britain, France, and Germany, between 1850 and 1950. Patterns of union organization, political party—trade union links, the growth of industrial relations systems, and the evolution of public policies toward labor are emphasized.

**499 Directed Studies**

For description see p. 322.

**530 Comparative Industrial Relations Systems I: Western Europe** Fall. 3 credits. For graduate students.

J. Windmuller.  
Students in this course attend the lectures in I&LR 330 (see description for I&LR 330). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in I&LR 330 and related topics.

**531 Comparative Industrial Relations Systems II: Eastern Europe, Japan, and the Third World** Spring. 3 credits. For graduate students.

J. Windmuller.  
Students in this course will attend the lectures in I&LR 331 (see description for I&LR 331). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in I&LR 331 and related topics.

**532 Labor in Developing Economies** Spring. 3 credits.

G. Fields.  
Students in this course attend the lectures in I&LR 332 (see description for I&LR 332). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in I&LR 332 and additional topics.

**630 Seminar in International and Comparative Labor Relations** Spring. 3 credits. Prerequisite: undergraduates, I&LR 330 or 331; graduate students, I&LR 530 or 531; or permission of instructor. Intended for undergraduate and graduate students with some background in international and comparative labor relations.

J. Windmuller.  
An opportunity for reading and research on one or two central themes. Topics in recent years have included the labor aspects of the multinational corporation, worker participation in management, international labor movements, and American labor in world affairs.

**799 Directed Studies**

For description see p. 323.

## Labor Economics

R. Smith, chairman; R. Aronson, G. Boyer, J. Burton, G. Clark, R. Ehrenberg, G. Fields, R. Frank, W. Galenson, R. Hutchens, G. Jakubson, O. Mitchell, J. Svejnar

**140 Development of Economic Institutions**

Spring. 3 credits. Prerequisite for non-ILR students: permission of instructor.

G. Boyer.  
Designed to give the student an understanding of the historical development of our economic institutions and the nature of the problems incident to economic change and development as part of the background for understanding and analysis of important present-day issues. Attention is focused on the agricultural, commercial, and industrial revolutions, tracing their development from their beginnings in Western Europe to the present.

**240 Economics of Wages and Employment** Fall or spring. 3 credits. Prerequisites: Economics 101–102 or equivalent.

Staff.  
This course 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 are 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.

**340 Economic Security** Fall or spring. 3 credits. Staff.

History, philosophies, and the economic and social effects of social 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 and voluntary 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.



**343 Problems in Labor Economics** Fall or spring. 3 credits.

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.

**344 Comparative Economic Systems: Soviet Russia** Fall. 4 credits.

G. Clark.

A comparative analysis of the principles, structure, and performance of the economy of Soviet Russia. Special attention is devoted to industry and labor.

**440 The Economics of Fringe Benefits** Spring. 3 credits. Open to juniors, seniors, and graduate students.

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; a critical examination of the financing, administration, and general effectiveness of the plans.

**441 Income Distribution** Fall. 3 credits. Open to upperclass and graduate students.

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, international comparisons, and changing income distribution and growth.

**446 Labor Problems of the College-Educated: Professional Training, Employment, and Control** Fall. 3 credits.

R. Aronson.

Systematic exploration of the economic and institutional dimensions of the professions and other occupations recruited primarily from the college-educated population. Covers the growth and development of the college-educated work force and the utilization and compensation of the professionally trained in varied and changing work settings, and examines the economic and social implications of institutions in professional labor markets, such as licensure and unionism.

**495 Honors Program** Fall and spring (yearlong course). 3 credits each term.

For description see p. 322.

**497-498 Internship** Fall or spring. 3 and 6 credits.

For description see p. 322.

**499 Directed Studies**

For description see p. 322.

**540 Labor Economics** Fall. 3 credits.

Prerequisites: Economics 101-102 or equivalent. Required of graduate students majoring or minoring in labor economics and M.I.L.R. candidates.

R. Smith.

This course 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 are 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.

**541 Social Security and Protective Labor**

**Legislation** Spring. 3 credits. Normally required of graduate students majoring or minoring in labor economics and required of M.I.L.R. candidates.

Staff.

History, philosophies, and the economic and social effects of social 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 and voluntary 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.

**[642 Work and Welfare: Interactions between Cash-Transfer Programs and the Labor Market**

Fall. 3 credits: Prerequisite: some familiarity with microeconomics. Not offered 1983-84.

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.]

**643 Special Topics in Labor Economics** Fall or spring. 3 credits.

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.

**644 The Economics of Occupational Safety and Health** Spring. 3 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.

**645 Politics and Markets I** Fall. 4 credits.

Prerequisite: Economics 311 or 313 or permission of instructor.

R. Frank.

Focuses on applied microeconomic policy issues as a vehicle for studying the strengths and weaknesses of the market system. Topics covered include externalities, public goods, monopoly, economic regulation, and health and safety regulation.

**647 Evaluation of Social Programs** Spring. 4 credits.

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.

**648 Politics and Markets II** Spring. 4 credits.

Prerequisites: Economics 311 or 313 or permission of instructor.

R. Frank.

Employs economic analysis in the study of the conflict between the individualist and collectivist view of society. It begins with an examination of the ethical underpinnings of economic analysis and proceeds to consider such specific topics as corporate

responsibility, health and safety regulation, consumer protection regulation, and the economics of discrimination

**744 Seminar in Labor Economics** Fall. 3 credits. I&LR 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.

**745 Seminar in Labor Economics (also Economics 642)** Spring. 3 credits.

G. Jakubson.

Reading and discussion of selected topics in labor economics in the fields of theory, institutions, and policy.

**798 Internship**

For description see p. 323.

**799 Directed Studies**

For description see p. 323.

**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

S. Bacharach, chairman; L. Gruenfeld, T. Hammer, R. Stern, P. Tolbert, H. Trice, L. Williams

**120 Introduction to Macro Organizational Behavior and Analysis** Fall. 3 credits.

S. Bacharach.

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 nature of industrial organizations and of complex organizations in general, emphasizing authority relations, goals, the division of labor, and bureaucracy.

**121 Introduction to Micro Organizational Behavior and Analysis** Spring. 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 individual is described and examined as a formal and informal group member. Within this area, particular emphasis is placed on leadership, problem solving, and conflict resolution.

**222 Studies in Organizational Behavior: Regulating the Corporation** Fall. 3 credits.

R. Stern.

The course 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. The role of interest groups such as consumer or citizens organizations is also considered. Research and case materials focus on the implementation of environmental protection, occupational health and safety, equal opportunity, antitrust, and rate-setting regulations.

**320 The Psychology of Industrial Engineering** Fall. 4 credits.

T. Hammer.

A study of the human factors in the industrial engineering of work, work places, 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.

**321 Stress at Work** Fall or spring. 4 credits. Staff.

Explores the impact of the social psychological demands of work environments on employee stress. Among the topics to be discussed are (1) conceptual models of stress, (2) social, situational, and personal factors mediating the effects of stressors, and (3) adaptive coping processes. Readings will focus on the person-environment fit in the work setting, and social support networks, as well as on environmental stressors such as noise, high density, job structure, and unemployment. Specific attention will be given to the stressors faced by employees in service occupations.

**322 Comparative Theories of Organizational Behavior and Social Character** Fall. 3 credits. L. Gruenfeld.

A comparative social-psychological approach is used to examine theories of work, authority, conflict, and change in employment organization.

**323 Introduction to the Study of Attitudes** Fall. 4 credits. Open to juniors and seniors. T. Hammer.

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.

**324 Organizations and Deviant Behavior** Spring. 3 credits. Limited to 40 students. Prerequisite: one or more courses in both sociology and psychology. H. Trice.

Focus is on the relationship between organizations and deviant behavior. Covers (1) the nature and etiology of psychiatric disorders, particularly schizophrenia, the psychoneuroses, and psychosomatic disorders; (2) organizational factors related to these disorders and to the more general phenomena of role conflict and stress; (3) an examination of alcoholism as a sample pathology, in terms of personality characteristics and precipitating organizational factors; (4) evaluation of organizational responses to deviance; (5) the nature of self-help organizations such as Alcoholics Anonymous; and (6) the structure and functioning of the mental hospital.

**325 Organizations and Social Inequality** Spring 4 credits.

Examines the central role that organizations in industrial societies play in allocating income, status, and other resources to individuals. Marxist conceptions of class and Weberian conceptions of job authority will be examined to see what additional power they add to the explanation of social inequality, particularly in regard to income attainment. As the central unit of analysis in the course will be organizations, a historical section will be included that deals with the evolution of current control and compensation structures in large-scale organizations.

**326 Sociology of Occupations** Fall. 3 credits. Prerequisite: one or more courses in sociology. H. Trice.

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.

**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.

**328 Cooperation, Competition, and Conflict Resolution** Spring. 4 credits. Prerequisite: two courses 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.

**329 Sociological Analysis of Organizations** Fall. 3 credits. Prerequisites: I&LR 120 and 121 or equivalent. Staff.

Introduces students to the basic issues involved in the sociological analysis of organizations. It traces organizational theory from Max Weber to the most recent research. Among the themes to be discussed are internal structure of organizations, communication in organizations, decentralization, organizational change, organizational technology, and organizational environment.

**370 The Study of Work Motivation** Fall. 4 credits. Open to juniors and seniors with permission of instructor. 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.

**371 Individual Differences and Organizational Behavior** Fall. 4 credits. Recommended: some acquaintance with the substance and methods of behavioral or social science. L. Gruenfeld.

This course considers several related theories of personality relevant to an understanding of behavior and experience in organizations. The emphasis is on comparative systems of work cultures and corresponding social character types. A unit on the assessment of personality and a strategy for verification of theories of personality are presented to highlight research findings relevant to motivation, leadership styles, conflict, and stress in organizations.

**373 Organizational Behavior Simulations** Spring, weeks 1–7. 2 credits. Prerequisite: I&LR 120 and 121 or equivalent. R. Stern.

Basic principles of organizational behavior are studied through readings and participation in two 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. Organizational design, decision making, and conflict are the central topics of discussion. The contrasting bases of power in the two organizations permits the study of the assumption underlying organization structure and process.

**420 Group Processes** Fall. 4 credits. L. Gruenfeld.

Several conceptual and methodological approaches are applied to the observation of personality in groups. Students observe, analyze, and quantify behavior in ongoing groups. Emphasis is on systematic observation of interpersonal behavior in open field groups rather than contrived experimental groups.

**422 Groups in Work Organizations** Fall. 4 credits. Enrollment limited. Prerequisite: permission of instructor.

This is an applied social psychology course that emphasizes the building, maintenance, and renewal of purposive groups working in formal organizations. The course deals with models and variables that interact with group cohesion and performance. Structural, environmental, task, motivational, and interpersonal variables are considered. This is not intended as a sensitivity training laboratory; the course work is substantive and includes observation and analysis of live work groups in the field.

**423 Evaluation of Social Action Programs** Fall. 3 credits. H. Trice.

A consideration of the principles and strategies involved in evaluation research; experimental research designs, process evaluation, and adaptations of cost benefits and cost efficiency to determine the extent to which intervention programs in fields such as training and therapy accomplish their goals. The adaptation of these strategies to large social contexts such as child guidance clinics, mental health clinics, and programs in the poverty areas such as Head Start is considered. Includes fieldwork and emphasizes assessment of program implementation.

**424 Study of Public Sector Bureaucracy** Spring. 3 credits. Prerequisite: permission of instructor. S. Bacharach.

Field research in public sector organizations 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.

**425 Sociology of Industrial Conflict** Spring. 4 credits. R. Stern.

The focus is on the variety of theoretical and empirical evidence available concerning social, economic, and political causes of industrial conflict. The manifestations of conflict, such as strikes, labor turnover, absenteeism, and sabotage, and the influence on the environments in which they occur is emphasized.

**426 Theories of Industrial Society** Fall. 4 credits. Prerequisite: I&LR 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.

**473 Ecological Psychology: Behavior-Setting Analysis within the Organizational Context** Fall. 3 credits.

The origins, methods, and central concerns of ecological psychology. Ecological psychology is one

of the areas of specialization in psychology that has developed a theoretical framework and research technique for the study of behavior in everyday environments. Methods used to develop observation records as well as techniques used to divide the behavior stream into structural units will be examined. The primary focus of the course will be the more recent concerns of ecological psychology, namely, the study of community and organizational behavior settings. Assigned reading will provide an overview of the theory of behavior settings, the methods used to identify and describe settings, as well as practical applications in organizational psychology. Behavior-setting theory will be used as a point of departure in examining selected topics in organizational psychology; these include person-environment fit in the work setting, the impact of organizational size on social climate, work-life quality and job enrichment programs, and overload stress and staff "burn-out" in service settings.

**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.

**476 Unions and Public Policy in School Districts** Spring. 4 credits. Enrollment limited. Prerequisite: permission of instructor.  
S. Bacharach.

A continuation of I&LR 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.

**478 Applied Topics in Organizational Behavior** Fall. 4 credits. Prerequisite: 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.

**495 Honors Program** Fall and spring (yearlong course). 3 credits each term.

For description see p. 322.

**497-498 Internship** Fall or spring. 3 and 6 credits. For description see p. 322.

**499 Directed Studies**

For description see p. 322.

**520 Micro Organizational Behavior and Analysis** Fall. 3 credits.  
L. Williams.

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.

**521 Macro Organizational Behavior and Analysis** Spring. 3 credits.

S. Bacharach.

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.

**620 Theories of Organizational Change, Innovation, and Evaluation** Fall. 4 credits. Prerequisite: two organizational behavior courses at the 300 level, or advanced courses in sociology or psychology.  
H. Trice.

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.

**621 Organizational Diagnosis Intervention and Development** Spring. 4 credits. Prerequisites: undergraduates, I&LR 120 and 121; graduate students, I&LR 520 and 521 or equivalent. Permission of instructor required.

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.

**623 Theories of Industrial Society** Spring. 4 credits. Prerequisite: permission of instructor.  
S. Bacharach.

This course will concentrate on technology, bureaucracy, and the state, with a specific focus on alienation.

**625 Labor and Monopoly Capital: The Growth of Large United States Firms in the Past Century** Spring. 7 weeks only. 2 credits.  
Staff.

A critical review of two recent books with very different explanations for the rise of large, hierarchically differentiated corporations in the United States: Harry Braverman, *Labor and Monopoly Capital*, and Alfred D. Chandler, *The Divisible Hand*. These books are supplemented by articles on patterns of industrialization and internal structural transformation of large firms in the United States economy.

**627 Leadership in Organizations** Spring. 3 credits. Prerequisites: two organizational behavior courses at the 300 level, or advanced courses in sociology or psychology.

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.

**628 Cross-Cultural Studies of Organizational Behavior** Fall or spring. 3 credits. Designed for graduate students interested in research and sociopsychological theory at the workplace. Undergraduates with permission of instructor.

L. Gruenfeld.

How organizational behavior is affected by age (generational), sex, social class, and cultural variables. Both theoretical and research-related issues pertaining to these variables are explored to illustrate the social, psychological, and cultural explanations for age differences in job satisfaction and performance. What can be inferred from studies that ignore age (sex, social class, and cultural) differences? What are the causes and patterns, both subjective and objective, for age and other kinds of discrimination?

**629 Personality in Organization** Fall and spring. 4 credits. Prerequisite: I&LR 520 or equivalent. The aim of this course is to train students in the skills required to use observational methods. The topics to be covered are (1) reasons for choosing an observational method, (2) specific techniques used to study nonverbal communication, verbal interaction, and molar activity patterns, and (3) the steps involved in collecting and analyzing observational data.

**670 Sociological Study of Power** Fall. 3 credits.  
S. Bacharach.

The empirical, conceptual, and theoretical issues involved in the study of power. Power is analyzed within the context of an interaction paradigm, and thus, while the major emphasis of this course is on the examination of power dispersion in organizations and communities, relevant social-psychological literature is also drawn upon. Among the various works to be considered are those of Ganssø, Blau, and Dahl.

**672 Urban Politics and Public Policy** Fall. 3 credits.  
S. Bacharach.

The relationship between community processes and structures and public policy outputs. Focus is on such issues as the limitations of the classic elitist-pluralist debate and the recent controversy concerning centralization or decentralization of local government and the delivery of social services. Treatment of these stresses the value of applying sociological theory to questions of public policy. A primary concern is the integration of organizational and community theory.

**673 Cross-Cultural Explorations of Individual Differences** Fall. 3 credits.

A data-bank analysis of the relationship between socioeconomic status, socialization values, ethnicity, and various indices of individual differences such as interpersonal trust, propensity to take risks, self-concept, cognitive style, and job preferences.

**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 networks of 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.

**676 Systems of Labor Participation in Management** Fall, 4 credits. Limited to 25 students. Prerequisite: senior standing and permission of instructor.

T. Hammer, R. Stern.  
Examines the theory and practice of labor participation in systems ranging from informal shop-level participation to self-management. Special emphasis is placed on socio-technical systems of job design. Attention is also given to projects involving the restructuring of work and efforts to improve the quality of working life.

**677 Seminar in Field Research** Spring, 4 credits. Enrollment limited. Prerequisite: permission of instructor.

H. Trice.  
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 to share in the exploration of appropriate theories and concepts, and the possibility of actual field participation in an ongoing research project is explored.

**722 Theories of Organizational Behavior** Fall, 3 credits.  
Staff.

A proseminar of current topics in organizational psychology. Discussions based on current research and theoretical innovations in the field.

**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 ILR 723 and 724 includes (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.

**724 Behavioral Research Theory, Strategy, and Methods II** Spring. Variable credit. Prerequisite: permission of instructor. Must be taken in sequence with ILR 723, except by petition. Designed to meet the needs of M.S. and Ph.D. candidates majoring in organizational behavior, but other graduate students may enroll.

Staff.  
The purpose is to teach graduate students how to treat and interpret research data after they have been collected. The course will cover (a) data analysis and interpretation through the study of psychometric theory, (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.

**725 Analysis of Published Research in Organizational Behavior** Fall, 3 credits. Prerequisites: ILR 520-521 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.

**726 Organizational Behavior III** Spring, 3 credits. Prerequisite: ILR 520-521 or equivalent.

Staff.  
A team-taught comparison of different disciplinary approaches to organizational analysis and models.

Emphasis is on integrating different disciplinary approaches to selected organizational phenomena such as change and innovation, decision making and information processing, reward structures, or conflict resolution.

**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, and economic causes of industrial conflict. Forms of conflict to be studied include strikes, turnover, absenteeism, and sabotage. Some discussion of the implications of various types of worker management of firms for industrial conflict will be included.

**728 Seminar on Work Motivation** Spring, 2 or 4 credits. Prerequisite: ILR 520-521.

T. Hammer.  
Two independent but sequence-connected minicourses.  
(1) *Theories of Work Motivation*: 7 weeks, 2 credits. This course will provide an overview of basic concepts of human motivation with implications for theory and research. Intended to provide a basic understanding of theoretical issues involved in work motivation and knowledge of basic research approaches as these apply to individuals and groups in formal organizations.  
(2) *Seminar on Job Design*: 7 weeks, 2 credits. In the seminar, theories underlying the design of jobs are examined together with empirical research available in the job design area. The course will cover early theories and research in job design from scientific management and later developments, with particular attention paid to the recent emphasis on job design through job enlargement and job enrichment.

**798 Internship**

For description see p. 323.

**799 Directed Studies**

For description see p. 323.

**920 Organizational Behavior Workshop** Fall, 2 credits. Limited to M.S. and Ph.D. candidates in the department. S-U grades only.

S. Bacharach.  
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

L. Dyer, chairman; J. Boudreau, V. Briggs, F. Foltman, W. Frank, V. Huber, G. Milkovich, F. Miller, R. Risley, S. Rynes, W. Wasmuth

**260 Personnel Management** Fall or spring, 3 credits. Open only to ILR students. Non-ILR students may take ILR 151.

Staff.  
An introductory overview of the personnel function and the management of human resources from an institutional perspective. Topics include human resource decisions dealing with the roles of personnel, human resource planning, recruitment, selection, induction and orientation, performance appraisal, talent identification, career planning,

training, compensation, and organizational development. 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.

**360 Human Resource Economics and Public Policy** Fall or spring, 3 credits. Open to sophomores, juniors, and seniors.

V. Briggs.  
A review of contemporary labor-market trends and theories pertaining to labor-market intervention through public policy measures. Changes in the "older" programs of apprenticeship, vocational education, and vocational rehabilitation, as well as the "new" programs of the post-CETA era are studied. Special policy issues pertaining to youth, rural workers, welfare reform, public service employment, and worker relocation will be examined. Comparison will also be made with European initiatives.

**361 Effective Supervision** Fall, 7 weeks only, 2 credits. Prerequisite: ILR 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, nonunion, large, and small organizations and cover technical, psychological, social, and political issues at the supervisory level.

**365 New York State—Human Resource and Employee Relations Issues and Policies** Fall or spring, 3 credits. Open to ILR students participating in an Albany internship.

J. Slocum.  
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.

**366 Women at Work** Fall or spring, Variable 3 or 4 credits. Prerequisite: ILR 260 or equivalent.

F. Miller.  
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.

**369 Social Contract, 1964-1980** Fall or spring, 3 credits. Open to ILR students participating in Washington, D.C., internship.

S. Levitan.  
The seminar will examine labor-market developments and their measurements, with emphasis on current social strategies to ameliorate social problems. The systematic relationships between the elements of various programs, their purposes, the institutional structures designed to carry them out, and the clients they were designed to serve will be explored. Topics stressed will relate to current national issues and priorities. Students will engage in individual projects on topics approved by the instructor.

**469 Immigration and the American Labor Force** Spring, 3 credits. Prerequisite: ILR 360 or equivalent.

V. Briggs.  
The role that immigration has played as a source of human resource development in the United States.

The primary focus is on developments since the Immigration Act of 1965. In addition to legal immigration, the topic of illegal immigration and its effects are also examined. Public policy aspects of the issue are explored in depth.

**495 Honors Program** Fall and spring (yearlong course). 3 credits each term.

For description see p. 322.

**497-498 Internship** Fall or spring. 3 and 6 credits.

For description see p. 322.

**499 Directed Studies**

For description see p. 322.

**560 Personnel Management** Fall or spring 3 credits.

Staff.  
A survey course covering the major areas of the management of human behavior in work organizations. Consideration is given to such aspects of personnel work as job attitudes, motivation, human resource planning, recruitment and selection, training, management development, organization development, and compensation. Emphasis is on the application of theory and research to the solution of personnel problems.

**653 Personnel and Human Resource Management in the Eighties** Fall. 3 credits. Limited to 25 students. Prerequisite: seniors and graduate students with permission of instructor.

R. Risley.  
Seminar will be concerned with those areas of personnel and human resource management that leading practitioners believe will be of increased importance or will have significant change during the coming decade. Twelve 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 the advanced material prepared by the guest leader. Students should be prepared to be active participants in the seminar discussions and to have completed any advance assignments suggested by the guest seminar leader.

**659 Career Planning and Development** Fall. 3 credits. Prerequisite: I&LR 260 or equivalent.

V. Huber.  
Consideration of career planning and development from both the organizational and individual perspectives.

**661 Applied Personnel and Organizational Development Practice** Spring. 3 credits. Prerequisite: undergraduates, I&LR 260; graduate students, I&LR 560 or equivalent.

V. Huber.  
Deals with personnel development technique and organizational development intervention methodology. Students examine and practice group methods, feedback and processing technique, active listening, one-to-one counseling, behavior modeling, role playing, the case method, team building, survey-guided intervention, and other relevant methods, techniques, and issues. This course combines pertinent literature with the opportunity for hands-on practice in a workshop setting. Students have responsibility for developing and delivering scholarly papers that explore a specific method, technique, and/or critical issue. In addition, a final project requires a comprehensive proposal that describes an organizational development intervention.

**662 Management Training Simulation: Public Policy Issues in Social Agencies** Spring. 3 credits. Prerequisite: I&LR 260 or equivalent.

W. Wasmuth.  
Techniques of simulation are applied to a vocational rehabilitation facility, a community hospital, and a hotel banquet operation. Although much of the

material relates to health services management, simulation as an approach to training managers has wider and growing importance to all types of organizations. Students are provided with realistic problem-solving situations involving boards of directors, community resources, public policy issues, state and federal agencies, labor unions, and changing economic conditions.

**663 Job Matching: Job Search and Organizational Recruiting** Spring. 3 credits.

Prerequisites: undergraduates, I&LR 260; graduate students, I&LR 560.

S. Rynes.  
Research-oriented treatment of employment hiring practices from both the job-seeker and organizational perspectives. Topics include individual job search and choice, organizational recruiting strategies and practices, and methods used to predict on-the-job success (e.g., tests, interviews).

**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.

**665 Case Studies in Personnel Administration** Spring. 3 credits. Open only to graduate students and seniors with at least three courses in various personnel subareas.

Staff.  
An analysis of personnel management activities and their impact on organizational objectives and administration. Cases, incidents, and field data derived from a variety of institutional settings provide a framework for examining and explaining the various roles played by personnel managers. Students with a special interest in personnel are encouraged to use this course as a "capstone" to their studies.

**667 Managers and Managing** Fall. 3 credits. Prerequisite: I&LR 260.

Staff.  
A review of the operations of business and industrial organizations, including an emphasis on selected classical approaches to management theory; appointment, identification of management potential, careers and succession processes; managerial skills and responsibilities; management practices such as planning and direction, organization, communication, control, reward systems; management problems; emerging approaches and current issues in management. Particular emphasis is given to the responsibilities and practices of managers for effective employment of human resources in contemporary conditions.

**668 Staffing: Employee Selection and Utilization** Fall. 3 credits. Prerequisites: I&LR 260 or equivalent and one semester of statistics; working knowledge of factor analysis, item analysis, regression analysis, and ANOVA.

J. Boudreau.  
An analysis of the staffing process as applied to employing organizations. Topics examined include sources of personnel, methods used to assess individual differences, methods used to assess organizational job requirements, problems associated with person-job matching, career planning, employee separations, and the relationship between the staffing process and other organizational processes.

**669 Administration of Compensation** Fall or spring. 3 credits. Prerequisite: I&LR 260 or equivalent.

L. Dyer, G. Milkovich, R. Risley.  
The development and administration of wage and salary programs. Major emphasis is given to the role of compensation in attracting, retaining, and

motivating employees. Topics investigated include motivation theory; factors influencing compensation levels; job evaluation; forms of compensation, including incentive plans and fringe benefits, special issues of managerial compensation; and problems of compensation control.

**691 Human Resource Planning** Spring. 4 credits. Prerequisites: I&LR 260 or equivalent and one course in statistics.

L. Dyer, G. Milkovich.  
The process of human resource personnel planning as practiced by public and private employers. Included are topics such as forecasting human resource needs, programming, techniques to meet forecasted needs, and methods of controlling an organization's supply of human resources. The seminar 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.

**693 Design and Administration of Training Programs** Spring. 3 credits. Prerequisite: I&LR 260 or equivalent.

W. Frank, V. Huber.  
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.

**696 Personnel Administration and Government Regulations** Fall. 3 credits. Prerequisite: I&LR 260 or equivalent.

R. Risley.  
A survey and analysis of government regulations affecting personnel management in nongovernment organizations, examining the framework within which management must operate. Government agencies' methods of enforcement of such regulations and the firm's responsibilities for failure to comply with these legal requirements are considered.

**760 Seminar In Personnel and Human Resource Management** 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.

**761 Human Resource Economics and Public Policy** Spring. 3 credits.

V. Briggs.  
A review of contemporary labor-market trends and theories pertaining to labor-market intervention through public policy measures. Changes in the "older" programs of apprenticeship, vocational education, and vocational rehabilitation as well as the "new" programs of the post-CETA era are studied. Special policy issues pertaining to youth, rural workers, welfare reform, public service employment, and worker relocation will be examined. Comparison will also be made with European initiatives.

**798 Internship**

For description see p. 323.

**799 Directed Studies**

For description see p. 323.

## Interdepartmental Courses

**150 Labor Problems in American Society** Fall or spring. 3 credits.

R. Aronson, V. Briggs, O. Mitchell.



A survey for students in other divisions of the University. An analysis of the major problems in industrial and labor relations, labor union history, organization, and operation, labor-market analysis and employment practices; industrial and labor legislation and social security, personnel management and human relations in industry; collective bargaining and the settlement of industrial disputes; and the rights and responsibilities of employers and employees.

**151 Personnel Management for Managers** Fall or spring. 3 credits. Not open to ILR students. Staff.

A study of the personnel function in work organizations, with special emphasis on the responsibilities of managers and supervisors. After reviewing evidence from behavioral science research on factors affecting work behavior, such major personnel areas as recruitment, selection, and placement; training; compensation and benefits; and discipline are considered.

**950 The Dissertation Process** Fall. 3 credits. Prerequisite: Masters degree or admission to Ph.D. candidacy.

G. Fields.

Oriented toward third-year graduate students in economics, organizational behavior, personnel and human resource studies, statistics, and collective bargaining. The purpose of the course is to help students choose and develop dissertation topics, drawing on the Special Committee for expert advice on the student's particular subject. Various aspects of the dissertation research process will be explored, including choosing a subject area, narrowing in on a research question, designing a research strategy, formulating a dissertation prospectus, conducting the research, writing the dissertation, and preparing for the job market. Faculty from several fields will make guest appearances.

## ILR Extension

### New York City

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.

**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 functions 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 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.

**354 Economics of Wages and Employment** Fall or spring. 3 credits. Prerequisites: Economics 101–102 or equivalent.

An introduction to the characteristics of the labor market and to analysis of wage and employment problems. Among topics studied are the composition of the labor force, job-seeking and employment practices, methods of wage determinations, theories of wages and employment, economic effects of unions, the nature and causes of unemployment, and programs to combat joblessness and poverty.

**355 Society, Industry, and the Individual I** Fall 3 credits.

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 nature of industrial organizations and

of complex organizations in general, emphasizing authority relations, goals, the division of labor, and bureaucracy.

**356 Society, Industry, and the Individual II** Spring. 3 credits.

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 individual is described and examined as a formal and informal group member. Within this area, particular emphasis is placed on leadership, problem solving, and conflict resolution.

**357 Labor Education II** 3 credits.

An advanced course in the organization and administration of labor education programs. The course is divided into two parts. Part I: organization and administration of labor education programs; how to work with the union hierarchy; planning the "first" program; developing an education committee; budgeting and financing programs; managing time and dealing with job stresses; recruiting and publicizing programs; basic interpersonal relations; handling controversy in the classroom; writing reports and memos; organizing records and files; evaluating your work. Part II: development of course outlines and how to choose and use the appropriate methods and techniques for each session. Students will develop a subject-matter specialty, research materials needed, and teach the subject. Practical skills will be incorporated into the classroom work.

**420 Group Processes** Fall or spring. 3 credits.

An advanced undergraduate and beginning graduate course emphasizing group development. Readings and discussion are concerned with interpersonal attraction, conformity, interaction process, leadership, group effectiveness, norms, etc. Laboratory experiences in group tasks are provided.

**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.

**683 An Analysis of the Union Steward's Role** Fall or spring. 3 credits.

The course is an examination of the steward's role in relation to the local union and to the workplace setting. Attention is directed to how industrial conflict, economics, technological constraints, social organization, and tactics and strategies of the steward are related. Consideration is also given to authority of the steward, to conflicting expectations associated with the role, and to comparative studies of stewards. In general, the steward's role is used as a focal point for understanding important aspects of the worksite and the union. The student is expected to write a research paper on a salient aspect of the steward's role and social structure.

**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.

**686 Collective Bargaining in the Public Sector**

Fall or spring. 3 credits.

An examination of the development, practice, and extent of collective bargaining between federal, state, and local governments and their employees. The course will emphasize public policy issues related to sovereignty, unit determination, representation procedures, and the strikes against government.

**689 Labor Education** Fall or spring. 3 credits.

Prerequisite: permission of instructor.

An examination will be made of labor education, 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.

## Faculty Roster

- Aronson, Robert L., Ph.D., Princeton U. Prof., Labor Economics
- Bacharach, Samuel, Ph.D., U. of Wisconsin. Prof., Organizational Behavior
- Blumen, Isadore, Ph.D., U. of North Carolina. Prof., Economic and Social Statistics
- Boudreau, John W., Purdue U. Asst. Prof., Personnel and Human Resource Studies
- Boyer, George R., Ph.D., U. of Wisconsin. Asst. Prof., Labor Economics
- Briggs, Vernon M., Jr., Ph.D., Michigan State U. Prof., Personnel and Human Resource Studies
- Burton, John F., Jr., Ph.D., U. of Michigan. Prof., Collective Bargaining, Labor Law, and Labor History/Labor Economics
- Clark, M. Gardner, Ph.D., Harvard U. Prof., Labor Economics/International and Comparative Labor Relations
- Craypo, Charles, Ph.D., Michigan State U. Prof., Extension
- Cullen, Donald E., Ph.D., Cornell U. Prof., Collective Bargaining, Labor Law, and Labor History
- Daniel, Cletus E., Ph.D., U. of Washington. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History
- Doherty, Robert E., Ed.D., Columbia U. Prof., Extension/Collective Bargaining, Labor Law, and Labor History
- Donovan, Ronald, M.A., U. of Minnesota. Prof., Extension/Collective Bargaining, Labor Law, and Labor History
- Dyer, Lee D., Ph.D., U. of Wisconsin. Assoc. Prof., Personnel and Human Resource Studies
- Ehrenberg, Ronald, Ph.D., Northwestern U. Prof., Labor Economics
- Farley, Jennie T., Ph.D., Cornell U. Assoc. Prof., Extension
- Fields, Gary S., Ph.D., U. of Michigan. Prof., Labor Economics
- Foltman, Felician F., Ph.D., Cornell U. Prof., Personnel and Human Resource Studies
- Frank, William W., Ph.D., Michigan State U. Prof., Extension/Personnel and Human Resource Studies
- Galenson, Walter, Ph.D., Columbia U. Jacob Gould Schurman Professor, Labor Economics/International and Comparative Labor Relations
- Gold, Michael E., L.L.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
- Hammer, Tove H., Ph.D., U. of Maryland. Assoc. Prof., Organizational Behavior
- Hanslowe, Kurt, J.D., Harvard U. Prof., Collective Bargaining, Labor Law, and Labor History
- Huber, Vandra L., D.B.A., Indiana U. Asst. Prof., Personnel and Human Resource Studies
- Hutchens, Robert M., Ph.D., U. of Wisconsin. Assoc. Prof., Labor Economics
- Kaufman, Jacob J., Ph.D., Columbia U. Prof., Extension
- Korman, A. Gerd, Ph.D., U. of Wisconsin. Prof., Collective Bargaining, Labor Law, and Labor History
- Lieberwitz, Risa L., J.D., U. of Florida. Asst. 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., Economic and Social Statistics
- Milkovich, George, Ph.D., U. of Minnesota. Prof., Personnel and Human Resource Studies
- Miller, Frank B., Ph.D., Cornell U. Prof., Personnel and Human Resource Studies
- Mishel, Lawrence R., U. of Wisconsin. Asst. Prof., Collective Bargaining, Labor Law, and Labor History
- Mitchell, Olivia S., Ph.D., U. of Wisconsin. Asst. Prof., Labor Economics
- Morris, James O., Ph.D., U. of Michigan. Prof., Collective Bargaining, Labor Law, and Labor History
- Nash, Abraham, Ph.D., New York U. Prof., Extension
- Rehmus, Charles M., Ph.D., Stanford U. Prof., Collective Bargaining, Labor Law, and Labor History
- Risley, Robert F., Ph.D., Cornell U. Prof., Personnel and Human Resource Studies/Extension
- Ross, Philip, Ph.D., Brown U. Prof., Collective Bargaining, Labor Law, and Labor History
- Rynes, Sara L., Ph.D., U. of Wisconsin. Asst. Prof., Personnel and Human Resource Studies
- Salvatore, Nicholas, Ph.D., U. of California at Berkeley. Asst. Prof., Collective Bargaining, Labor Law, and Labor History
- Seeber, Ronald L., Ph.D., U. of Illinois. Asst. Prof., Collective Bargaining, Labor Law, and Labor History
- Smith, Robert S., Ph.D., Stanford U. Prof., Labor Economics
- Stern, Robert N., Ph.D., Vanderbilt U. Assoc. Prof., Organizational Behavior
- Trice, Harrison M., Ph.D., U. of Wisconsin. Prof., Organizational Behavior
- Velleman, Paul F., Ph.D., Princeton U. Assoc. Prof., Economic and Social Statistics
- Wasmuth, William J., D.B.A., Indiana U. Prof., Extension/Personnel and Human Resource Studies
- Wertheimer, Barbara M., M.A., New York U. Assoc. Prof., Extension
- Whyte, William F., Ph.D., U. of Chicago. Prof., Organizational Behavior/International and Comparative Labor Relations
- Williams, Lawrence K., Ph.D., U. of Michigan. Prof., Organizational Behavior
- Windmuller, John P., Ph.D., Cornell U. Prof., Collective Bargaining, Labor Law, and Labor History/International and Comparative Labor Relations

## Law School

### Administration

Peter W. Martin, dean of the law faculty and professor of law

Jane L. Hammond, law librarian and professor of law

Robert B. Kent, associate dean for academic affairs and professor of law

Albert C. Neimeth, associate dean and director of alumni affairs and placement

Kristine R. Kreilick, associate law librarian

John Lee Smith, dean of students

Anne Lukingbeal, assistant dean and director of admissions and financial aid

Frances M. Bullis, director of development and public affairs

### 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 thoroughly 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 limited number of students will be admitted to a program of study leading to the degree of Doctor of Law "with specialization in international affairs."

There are combined graduate degree programs with the Graduate School of Business and Public Administration, the College of Arts and Sciences, the Department of City and Regional Planning, and the School of Industrial and Labor Relations, 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 is a small one, to which only a few students are admitted 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 *Announcement of the Law School*, obtainable from the Director of Admissions, Myron Taylor Hall.

### First-Year Courses

- 500 Civil Procedure
- 502 Constitutional Law
- 504 Contracts
- 506 Criminal Justice
- 508 Practice Training I
- 509 Practice Training II
- 512 Property
- 515 Torts

### Upperclass Courses

- 600 Administrative Law
- 604 Advanced Civil Procedure
- 608 Antitrust Law
- 610 Business Associations I
- 611 Business Associations II
- 614 Business Torts
- 618 Commercial Law
- 620 Comparative Law
- 622 Conflict of Laws
- 624 Criminal Procedure: From Indictment to Sentence
- 626 Criminal Procedure: Investigation
- 628 Debtor-Creditor Law
- 630 Employment Discrimination
- 632 Enterprise Organization
- 634 Environmental Law
- 636 Estate and Gift Taxation
- 638 European Economic Community
- 640 Evidence
- 642 Family Law
- 644 Federal Courts
- 646 Federal Income Taxation
- 648 Intellectual and Industrial Property
- 650 International Law
- 652 International Taxation
- 654 International Trade Law
- 656 Interviewing, Counseling, and Fact Investigation
- 658 Labor Law
- 660 Land-Use Planning
- 664 Law Practice Dynamics
- 666 Law, Society, and Morality
- 668 Lawyer as a Negotiator
- 670 Lawyers and Clients
- 672 Legal History
- 674 Local Government
- 676 Process of Property Transmission
- 678 Professional Responsibility
- 680 Real Estate Transfer and Finance
- 682 Securities Regulation
- 684 Soviet Law
- 688 Taxation of Corporations and Shareholders

- 690 Taxation of Partnership Income

- 692 Trial Advocacy
- 694 Trusts and Estates I

### Problem Courses and Seminars

- 700 American Legal Theory
- 704 Children's Rights
- 706 Computer Applications in Law Practice and Legal Education
- 710 Copyright, Trademark, and Patent Law
- 714 Corporate Practice
- 718 Equal Protection Seminar
- 722 Ethics of Corporate Practice
- 726 Freedom of Expression
- 732 International Business Transactions
- 736 Labor Arbitration Seminar
- 740 Law and Economics Seminar
- 744 Law and Medicine
- 748 Lawyers and Moral Responsibility
- 752 Legal Aid I
- 753 Legal Aid II
- 758 Multinational Enterprise
- 762 Official Liability
- 766 Problems in Legislation
- 770 Products Liability Seminar
- 778 Remedies
- 782 Selected Problems in Commercial Law
- 788 Theories in Law, Science, and Ethics

### Faculty Roster

Aman, Alfred C., Jr., J.D., U. of Chicago. Prof.  
 Barceló, John J. III, S.J.D., Harvard U. Prof.  
 Clermont, Kevin M., J.D., Harvard U. Prof.  
 Cramton, Roger C., J.D., U. of Chicago. Robert S. Stevens Professor of Law  
 Curtiss, W. David, LL.B., Cornell U. Prof.  
 Dean, W. Tucker, J.D., U. of Chicago. Prof.  
 Eisenberg, Theodore, J.D., U. of Pennsylvania. Prof.  
 Gunn, Alan, J.D., Cornell U. Prof.  
 Hammond, Jane L., J.D., Villanova U. Prof.  
 Hanslowe, Kurt L., J.D., Harvard U. Prof.  
 Hay, George A., Ph.D., Northwestern U. Prof., Law/Economics  
 Henn, Harry G., J.S.D., New York U. Edward Cornell Professor of Law  
 Hillman, Robert A., J.D., Cornell U. Prof.  
 Johnson, Sheri L., J.D., Yale U. Asst. Prof.  
 Kent, Robert B., LL.B., Boston U. Prof.  
 Lyons, David B., Ph.D., Harvard U. Prof., Law/Philosophy  
 Martin, Peter W., LL.B., Harvard U. Prof.  
 Oesterle, Dale A., J.D., U. of Michigan. Assoc. Prof.  
 Osgood, Russell K., J.D., Yale U. Prof.

Palmer, Larry I., LL.B., Yale U. Prof.  
 Roberts, Ernest F., LL.B., Boston Coll. Edwin H.  
 Woodruff Professor of Law  
 Rossi, Faust F., J.D., Cornell U. Samuel S. Leibowitz  
 Professor of Trial Techniques  
 Schwab, Stewart J., Ph.D., U. of Michigan. Asst. Prof.  
 Simson, Gary J., J.D., Yale U. Prof.  
 Summers, Robert S., LL.B., Harvard U. William G.  
 McRoberts Research Professor in Administration of  
 the Law  
 Thoron, Gray, LL.B., Harvard U. Prof.  
 Wolfram, Charles W., LL.B., U. of Texas. Prof.  
 Younger, Judith T., J.D., New York U. Prof.  
 Zacharias, Fred C., LL.M., Georgetown U. Law  
 Center. Asst. Prof.

## Division of Nutritional Sciences

### Administration

Malden C. Nesheim, director  
 Marjorie M. Devine, associate director for academic affairs  
 Lemuel D. Wright, graduate faculty representative.  
 Field of Nutrition  
 Mary Morrison, division honors chairperson  
 J. Apgar, W. Arion, G. Armbruster, R.E. Austic,  
 D. Bauman, A. Bensadoun, C. A. Bisogni, M. Brink,  
 T. C. Campbell, G. F. Combs, A. Gillespie, J. D. Haas,  
 J-P. Habicht, R. Holmes, M. Kazarinoff, R. Klippstein,  
 J. M. Koch, L. P. Krook, S. Kumanyika, M. C. Latham,  
 D. A. Levitsky, B. A. Lewis, M. Mapes, D. Miller,  
 N. Mondy, C. Olson, R. Parker, N. Peckenpau, M.  
 Pimentel, K. Rasmussen, J. M. Rivers, D. A. Roe,  
 D. Sanjur, R. Schwartz, L. Stephenson, M. Stipanuk,  
 E. Thorbecke, V. Utermohlen, D. VanCampen,  
 P. J. VanSoest, R. G. Warner, R. H. Wasserman,  
 M. Wattford, R. J. Young, D. B. Zilversmit

### The Division

Nutritional science deals with the intricate relationship of food, nutrition, and health. At Cornell, the focal point for this broad field of study, which ranges from nutrient chemistry to world hunger, is the Division of Nutritional Sciences.

The division is affiliated with both the College of Human Ecology and the College of Agriculture and Life Sciences and brings together specialists from many disciplines in the biological and social sciences. Their work covers undergraduate and graduate teaching, nutrition research, and public education, including Cooperative Extension services.

The faculty in the division are working toward two closely related goals: increasing our knowledge of nutrition and health, and applying what we know to people's everyday problems. This approach carries over to undergraduate education. Students who major in nutritional sciences learn how to interpret basic research from the laboratory and from the social sciences. They also come to understand the practical implications of their studies. Many students have the chance to test out their ideas by conducting a research project or working in the community.

### Facilities

Most of the faculty of the division work in Savage Hall and Martha Van Rensselaer Hall. In addition to housing offices, classrooms, and seminar rooms, these buildings contain animal-care and research facilities, specialized laboratories, a human metabolic research unit, and interactive terminals for the University's computer system.

Savage Hall also has a graduate reading library, and in Martha Van Rensselaer Hall the division has set up the Learning Resources Center, which many undergraduates use 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.

### The Major

The B.S. degree program with a major in nutritional sciences (NS) offers five major options, but all of them give students a thorough foundation in the basic sciences, the field of nutrition, and communication skills. Graduates are qualified for a variety of entry-level positions in laboratory research, consumer affairs, nutrition education, and clinical and public-health services. All students are well prepared to pursue dietetic training or advanced study in fields such as nutrition, food science, biomedical sciences, and public policy.

Most undergraduates who major in nutritional sciences enroll in the College of Human Ecology. Students in the College of Agriculture and Life Sciences can also pursue a nutritional sciences option through the General Studies Program, and students in the College of Arts and Sciences can take a nutrition concentration as an independent option in the Division of Biological Sciences. Nutrition courses can be used to meet graduation requirements in all three colleges.

### Academic Advising

Every student majoring in nutritional sciences 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 not only helps students select courses but can often suggest opportunities for individual study or experience outside the classroom.

The specific course requirements for graduation and for each major option are listed in the Human Ecology *Student Guide*, available on request. Questions about undergraduate study should be addressed to Marjorie Devine, associate director for academic affairs, 334 Martha Van Rensselaer Hall.

### The Core Curriculum

In their freshman and sophomore years, all undergraduates majoring in nutritional sciences follow a core curriculum that builds the foundation for any aspect of advanced study in nutrition. The core curriculum includes courses in food and nutrition, laboratory skills, humanities and communications, introductory social sciences, and basic sciences. There is some choice of science courses, but all nutrition students need a good background in general and organic chemistry, biochemistry, microbiology, physiology, and mathematics.

Transfer students need to pay particular attention to the core curriculum and may need to take an extra semester to fulfill all of the basic requirements, especially in the sciences. The course NS 300, Special Studies for Undergraduates, which allows students to take "pieces" of courses, helps transfer students integrate their previous training into the requirements for the nutritional sciences major without duplicating course work.

By their junior year, students start taking the more specialized courses required for the nutritional sciences option they choose: experimental and consumer food studies, nutrition, nutritional biochemistry, clinical nutrition, or community nutrition. The core curriculum ensures that they can move into any option or change options.

### Options

#### Experimental and Consumer Food Studies

Students electing this option concentrate on basic and applied science courses, including physiochemical aspects of food, experimental food methods, and nutrition. With their knowledge of how the composition and treatment of food affect food quality, safety, acceptability, and nutritive value, graduates find jobs in dietetics, food service, development and evaluation of food products, food and nutrition education, consumer service, and public policy. To support these career options, additional course work is recommended in areas such as dietetics, food service administration, communications, economics, government, public policy, marketing, and management.

#### Nutrition

This option is designed for students who have a broad interest in the scientific bases of nutritional and food sciences. It offers opportunity to plan concentration of various courses to meet specific career goals. The program of lectures and laboratories in biochemistry, physiology, and microbiology provides a basis for advanced study in either human nutrition or food.

#### Nutritional Biochemistry

This basic science-oriented curriculum prepares students for advanced study in the nutritional and biomedical sciences. Students who wish to explore more broadly the scientific basis of food and nutrition may wish to concentrate in this area. Courses and laboratory work in chemistry, biochemistry, and physiology help develop a deeper understanding of nutrient action at the subcellular level.

#### Clinical Nutrition

This option builds on the basic science core to form a solid foundation in the biological aspects of human nutrition. Designed for students interested in pursuing advanced study in human nutrition or medicine, the program stresses courses and laboratory work in the natural and biological sciences.

#### Community Nutrition

This option gives students the skills to help people translate nutritional knowledge into action. It provides a strong background in basic and nutritional sciences but also includes supporting courses in the social sciences and communications. Practical experience through supervised field study is strongly recommended and is an asset to finding entry-level positions in nutrition education, community agencies, or field research.

### Dietetics

Students interested in applied nutrition should consider planning their course work to meet the requirements for membership and registration in the American Dietetic Association (ADA). Courses and electives that will meet the requirements of all five nutritional sciences major options can fulfill the ADA's basic and specialized academic requirements as well. Students are then eligible to pursue the remaining ADA requirements after graduation: the experience component or internship required for membership and for registration, and the national certifying examination required for a registered dietitian.

Advisers in the division will help students plan their course work to meet the ADA's academic requirements and will counsel them on applying for



internships. Additional information on the dietetics program at Cornell can be obtained from Rose Marie Holmes, 314 Martha Van Rensselaer Hall, and Joan M. L. Koch, 373 Martha Van Rensselaer Hall.

## Field Study Program

Structured field experience in a community agency or health-care facility can be taken for credit in several ways: through an independent study course, as a class project, or as a summer study project. Interested students should consult Nancy Peckenpaugh, the division's field-study coordinator.

## Independent Study

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 Dr. Devine 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 option in nutritional sciences, 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.

For more information, students should contact Mary A. Morrison, honors chairperson, N-205A Martha Van Rensselaer Hall.

## Courses Recommended for Nonmajors

Courses in nutritional sciences can strengthen programs of study in biological science, medicine, agriculture, food science, human services, and other fields.

Introductory courses in nutrition (NS 115) and food (NS 146) are open to all students, as are some special interest courses (NS 222, Maternal and Child Nutrition; NS 325, Sociocultural Aspects of Food and Nutrition; NS 346, Consumer Food Issues; and NS 457, National and International Food Economics).

Nonmajors who have taken college courses in chemistry, biological sciences, and nutritional sciences may elect advanced food and nutrition courses with the permission of the instructor.

## Graduate Programs

Graduate study is administered by the Field of Nutrition, a group of more than forty 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 major in animal nutrition, human nutrition, international nutrition, nutritional biochemistry, foods, or general nutrition. A professional Master of Nutritional Science (M.N.S.)

degree in clinical nutrition combines academic study and research on campus with clinical training at affiliated institutions in Upstate New York and New York City. Field experience is also a component of concentrations in community nutrition, 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, Savage Hall, Ithaca, New York 14853.

## Nutritional Sciences Courses

**115 Ecology of Human Nutrition and Food** Fall or spring. 3 credits. Prerequisites: fall, high school biology (juniors and seniors with advanced biological science background must have permission of the instructor); spring, a one-semester college biology course or permission of the instructor. S-U grades optional. Cost of handouts and pamphlets, \$3.

Fall: M W F 1:25. Spring: M W F 11:15. Four discs scheduled in place of some lec. Evening prelims: fall, Sept. 27, Oct. 25, Nov. 22; spring, to be arranged. M. Devine.

An introduction to the field of human nutrition and food. Includes study of human nutritional needs; problems encountered in providing food to meet nutritional needs; relationships among physiological needs, sociocultural systems, food, and the significance of these relationships to health. Discussion of current issues, such as vegetarianism, weight control, and dietary goals, is included.

**146 Introductory Foods** Fall and spring. 3 credits. Each section limited to 16 students. Prerequisite: NS 115 or concurrent registration. Permission of instructor during course registration required (permission-of-instructor forms must be obtained from, and returned to, 335 Martha Van Rensselaer Hall). Cost of handouts, \$2.

Lec, M 12:20; labs, T R 10:10–12:05 or 2:30–4:25. Evening prelims: fall, Nov. 8; spring, to be arranged. M. Pimentel.

Criteria for evaluating the practice of the science of food and nutrition. Laboratory includes an introduction to the physiochemical properties of food and the relationship of these properties to preparation techniques and palatability characteristics of food. Meal preparation, focusing on human nutritional needs and the management of money and time, is included.

**222 Maternal and Child Nutrition** Spring. 3 credits. Prerequisites: NS 115 and a college biology course. S-U grades optional.

M W F 11:15. C. Olson. Involves a study of the nutritional requirements in pregnancy, lactation, and 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.

**246 Introduction to Physiochemical Aspects of Food** Fall or spring. 4 credits. Each section limited to 18 students. Prerequisites: a college course in organic chemistry or biochemistry, NS 146, and permission of instructor during course registration (permission-of-instructor forms must be obtained from, and returned to, 335 Martha Van Rensselaer Hall). S-U grades optional.

Lecs, T R 9:05; labs, T R 10:10–12:35 or M W 2–4:25. Fall: B. Lewis. Spring: R. Parker.

A study of (a) the colligative properties of solutions; (b) colloidal systems—sols, gels, foams, and emulsions; (c) physical and chemical properties of the major groups of foods, the effect of basic methods of food preparation and preservation on these properties, and their relation to food quality—especially color, flavor, and texture. Laboratories introduce the experimental study of food and illustrate the function of ingredients and effect of treatment on food quality.

**300 Special Studies for Undergraduates** Fall or spring.

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 forms available from the Counseling Office, N105 Martha Van Rensselaer Hall. 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.

**301 Nutritional Aspects of Raw and Processed Foods (also Food Science 301)** Spring. 3 credits. Prerequisite: NS 115 and organic chemistry or permission of the instructor.

M W F 9:05. D. Miller.

An evaluation of the nutritional qualities of human foods with emphasis on changes that occur during processing and storage. Topics include criteria and methods for nutritional evaluations of foods, factors that may affect nutrient loss, descriptions of the composition and nutritional role of selected commodities, food fortification, food additives, fabricated foods, fast foods, and minimally processed foods.

**[302 Field Study with Cooperative Extension**

Fall. 2 credits. Limited to 10 juniors and seniors. Prerequisites: NS 115, 146, and permission of instructor. S-U grades optional. Not offered fall 1983; next offered fall 1984. Students expecting to enroll in NS 302 in 1984 should elect NS 325 in fall 1983 to prevent scheduling conflict.

F 12:20–4, field trips to nearby counties are arranged. R. Klippstein.

Upperclass students, working as a team, select a current nutrition issue and prepare and present a program to a regularly scheduled cooperative extension audience. The course stresses ways to present food and nutrition information to various types of lay audiences. Methods used may include small group discussion, food demonstration, illustrated lecture, and/or radio and newspaper communication. The importance of accurate information and a knowledge of audience needs and interests is stressed. Each student prepares a leaflet of information that is distributed during the group program. Students should reserve Friday afternoon for field trips and teaching experiences.]

**325 Sociocultural Aspects of Food and Nutrition** Fall. 3 credits. Limited to juniors and seniors. Prerequisites: NS 115 and a college course in anthropology or sociology.

M W F 2:30. D. Sanjur.

The course offers a cross-cultural perspective for understanding the environmental and sociocultural parameters affecting the development of food consumption patterns. Emphasis is on theories on formation of food habits, dietary methodologies, ethnicity and food habits, and educational programs in nutrition, in national and international contexts.

**331 Physiological and Biochemical Bases of Human Nutrition** Spring. 3 credits. Prerequisites: Biological Sciences 300 or 331 and NS 115 or equivalent. S-U grades optional.

M W F 10:10. M. C. Nesheim, T. C. Campbell. The biochemical and physiological bases for human nutrition requirements, including digestion and absorption, energy metabolism, food intake regulation, protein amino acids, minerals, vitamins, and determination of nutritional status.

**332 Laboratory Methods in Nutritional Sciences** Fall and spring. 3 credits. Each section limited to 18 students. Prerequisites: NS 331 or concurrent registration and permission of instructor during course registration (permission-of-instructor forms must be obtained from, and returned to, 335 Martha Van Rensselaer Hall).

Lec, M 12:20; labs, M W 1:25-4 or T R 1:25-4. M. Stipanuk. Introduction to principles and procedures of experimental design, analytical techniques, and data analysis in human nutrition. Emphasis on methods of analysis of nutrients and metabolites in food, tissues, and body fluids. Application of these methods in assessing physiological and biochemical responses to alterations of nutrient intake in animal and human studies.

**346 Consumer Food Issues** Fall. 2 credits. Limited to 30 juniors and seniors. Prerequisites: NS 115 and 146 or permission of instructor. S-U grades optional.

T R 12:20. C. Bisogni. An examination of selected consumer issues related to the availability, safety, and quality of food. Current legislative and regulatory proposals will be investigated in terms of relevant research and potential impact on consumers and the food supply.

**347 Human Growth and Development: Biological and Social Psychological Considerations (also Human Development and Family Studies 347)** Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent; Human Development and Family Studies 115 or Psychology 101 and NS 115 or equivalent.

M W F 1:25. J. Haas, H. Ricciuti. A review of major patterns of physical growth from the fetal period through adolescence, with consideration of biological and socioenvironmental 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).

**361 Biochemistry and Human Behavior (also Psychology 361)** Fall. 3 credits. Prerequisites: Biological Sciences 101-102, Chemistry 103-104, Psychology 123, or permission of instructor. A fundamental knowledge of human biology and chemistry is essential. S-U grades optional.

M W F 11:15. D. Levitsky. A survey of the scientific literature on the role of brain and body biochemical changes as determinants of human behavior. The topics covered include action and effects of psychopharmacologic agents, biochemical determinants of mental retardation, biochemical theories of psychosis, and effects of nutrition on behavior.

**378 Management Principles in Foodservice Operation** Spring. 4 credits. Prerequisites: NS 246 and Agricultural Economics 220, or Hotel Administration 211 or Industrial and Labor Relations 121 or 151 or 363 or equivalent, or permission of instructor. S-U grades optional. Estimated cost, \$5.

T R 10:10-12:05. R. Holmes. Application of management principles to foodservice operations involved in the production, distribution, and service of quality food in quantity. Includes menu planning, foodservice layout and design, production and service controls, purchasing, food-cost control, personnel management, sanitation, and safety.

**398 Honors in Nutritional Sciences** Fall. 1 credit. Limited to students admitted to the division honors program. S-U grades only.

T 2:30. M. Morrison, coordinator. Research design. Analysis of research papers on selected topics.

**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 forms to be signed by the instructor directing the study and the associate director of academic affairs. The forms, available from the Counseling Office, are 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.

**400 Directed Readings**

For study that predominantly involves library research and independent reading.

**401 Empirical Research**

For study that predominantly involves data collection and analysis or laboratory or studio projects.

**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.

**403 Teaching Apprenticeship**

For study that includes assisting faculty with instruction.

**415 Field-based Learning in Nutrition** Fall, spring, or summer. 2-6 credits. S-U grades optional. Prerequisites: junior, senior, or graduate standing; 9 hours of coursework in DNS; previous or concurrent registration in Human Ecology 4D 100 or equivalent experience and permission of instructor. Obtain application/questionnaire in DNS Undergraduate Office (335 Martha Van Rensselaer Hall).

Hours in placement arranged individually; biweekly seminar to be announced. N. Peckenpaugh.

Undergraduate and graduate students are placed, according to their interests and backgrounds, in community organizations and agencies that provide nutrition and food services. Placements are individually designed to enable students to apply nutrition concepts learned in the classroom. A biweekly seminar provides a basis for sharing of experiences among students and for integration of theory and practice. Students may be required to provide their own transportation to placements.

**441 Nutrition and Disease** Fall. 4 credits.

Prerequisites: NS 331 and a human physiology course. S-U grades optional. Cost of handouts and pamphlets, \$5.

M W F 10:10 and F B. 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 are diabetes mellitus, starvation, obesity, nutritional assessment, nutritional pharmacology, severe injury, infection, cancer, gastrointestinal diseases, liver disorders, renal diseases, cardiovascular diseases, and pediatrics. Original research papers, books, review papers, and publications of professional organizations are used throughout the course.

**442 Diet Formulation and Analysis** Fall. 2 credits. Limited enrollment. Prerequisites: NS 146, 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, 335 Martha Van Rensselaer Hall). S-U grades optional. Cost of handouts, pamphlets, and brochures, \$5.

Lec, M 11:15; lab, M 2:30-4:25 or T 11:15-1:10. Evening prelims: Oct. 13, Nov. 17. Instructor to be announced.

Development of skills in formulation and analysis of therapeutic dietary regimens. Various sources of information on food composition, diet planning, and enteral and parenteral nutrition supplements are used.

**445 Community Nutrition and Health** Spring

3 credits. Prerequisites: NS 331 or concurrent enrollment in 331. Recommended: NS 325. S-U grades optional. The field-project component of this course may involve off-campus activity; students are responsible for their own transportation or bus fare.

Lec-discs, M W 11:15; fieldwork lab, W 2:30-4:30. Staff.

Study of human nutrition and health problems from a community perspective; programs and policies related to nutrition at local, state, and federal levels; and approaches and techniques of effective application and dissemination of nutrition knowledge in communities.

**446 Physiochemical Aspects of Food** Fall.

3 credits. Prerequisites: NS 246 and a college course in 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.

**447 Physiochemical Aspects of Food—**

**Laboratory** Fall. 1 credit. Limited to 16 students. Prerequisite: NS 446 or concurrent registration. S-U grades optional.

T 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.

**448 Physiochemical Aspects of Food—**

**Laboratory** Fall. 1 credit. Limited to 16 students. Prerequisite: NS 446 or concurrent registration. S-U grades optional.

R 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.

**456 Experimental Foods Methods** Spring.

3 credits. Limited to 16 students. Prerequisites: NS 446 and 448. Recommended: a course in statistics.

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.

**457 National and International Food Economics**

Spring. 3 credits. Prerequisites: college course in economics and junior standing or permission of instructor. S-U grades optional.

M W F 9:05. E. Thorbecke. Examination of individual components essential for an understanding of the United States 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.

#### 488 Applied Dietetics in Foodservice Systems

Fall and spring. 3 credits. Limited to 30 students. Prerequisite or corequisite: NS 378, Microbiology 290 and 291, a course in learning theory, and permission of the instructor during course registration (permission-of-instructor forms must be obtained from, and returned to, 335 Martha Van Rensselaer Hall). S-U grades optional. Estimated cost, \$5. Uniform required.

Lec, T 8-9:55; lab, 1 section, M T W R or F 2:30-7; possible field trip. J. M. L. Koch.

Some laboratories will be arranged through Cornell Dining. Other experiences may be possible in community foodservice operations. Students will gain experience in care and use of institutional equipment, job analysis, volume food production, applied sanitation, in-service training, as well as other management skills required to operate a foodservice program.

#### 498 Honors in Nutritional Sciences

Spring. 1 credit. Limited to students admitted to the Division Honors Program. Students may register in NS 499 concurrently.

T 9:05. M. Morrison, coordinator.  
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.

#### 499 Honors Problem

Fall and spring. Credits to be arranged. Open only to students in the Division Honors Program.

Hours to be arranged. Division faculty; M. Morrison, coordinator.  
An independent literature, laboratory, or field investigation. Students should plan to spread the work over two semesters.

#### 600 Special Problems for Graduate Students

Fall or spring. Credit to be arranged. Limited to graduate students recommended by their chairperson 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.

#### 601-604 Advanced Nutrition Series

A series of nutrition courses offered jointly by the Division of Nutritional Sciences and the Departments of Animal Science and Poultry Science. Prerequisites: courses in nutrition, physiology, and biochemistry, including intermediary metabolism, or permission of instructor.

#### 601 Proteins and Amino Acids in Nutrition (also Animal Science 601)

Fall. 2 credits.  
W F 11:15. R. E. Austic, M. A. Morrison.  
Amino acid and protein nutrition with emphasis on the dynamic aspects of protein digestion, amino acid absorption, protein synthesis, amino acid metabolism, and nitrogen excretion. Discussion includes current topics of protein and amino acid nutrition, protein-energy interrelationships, amino acid and protein requirements, bioavailability of amino acids, and evaluation of protein quality. Emphasis is on basic principles and their applications to animal and human nutrition.

#### 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; mechanisms of hormonal regulation of lipolysis and fatty acid synthesis; and cholesterol metabolism and atherosclerosis.

#### 604 The Vitamins

Fall. 2 credits.  
T R 10:10. G. F. Combs, Jr.  
Lectures on nutritional aspects of the vitamins, including recent developments in nutritional and biochemical interrelationships with other nutrients and metabolites.

#### 606 Carbohydrate Chemistry

Spring. 2 credits.  
Prerequisite: organic chemistry. Recommended: biochemistry. S-U grades optional.  
T R 11:15. B. A. Lewis.  
The chemistry and physicochemical properties of simple carbohydrates, polysaccharides, and their complexes with lipids, proteins, and inorganic ions. The functional role of the carbohydrates in food systems and their nutritional implications will be discussed as well as applications of carbohydrates in food processing.

#### 611 Molecular Toxicology (also Toxicology 611)

Spring. 2 credits. Prerequisite: full-year 400-level course in biochemistry or equivalent. S-U grades optional. Offered alternate years.  
T R 11:15. C. Wilkinson, C. Campbell, A. Aronson, and others.

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.

#### 612 Methods of Assessing Physical Growth in Children

Spring. 2 credits. Limited to graduate students and students who have permission of the instructor. S-U grades optional.

Lec, T 1:25; lab, R 1:25-4:25. J. Haas.  
A laboratory course to train students in methods and techniques used to assess the physical growth and development of growing 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.

#### 613 Obesity and the Regulation of Body Weight (also Psychology 613)

Spring. 3 credits. Limited to 30 students. Prerequisites: one course in psychology, one course in nutrition. Undergraduate students may register with permission of the instructor. S-U grades optional. Offered alternate years.

M W F 11:15. 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.

#### 614 Topics in Maternal and Child Nutrition

Fall. 3 credits. Prerequisites: NS 331, 222 or 347, Biological Sciences 311, and permission of the 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.

#### 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.  
M 7:30-9:25 p.m. N. Mondy.  
Critical review of selected topics in the current literature. Emphasis on experimental data and basic scientific principles underlying modern theory and practice relative to food quality. Training in oral and written presentations of scientific reports.

#### 617 Teaching Seminar

First half of semester during fall or spring. 1 credit. Limited to division graduate students and students who have permission of the instructor. S-U grades only.  
W 7:30-9:30 p.m. M. Devine, N. Yaghlian.  
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.

#### 618 Teaching Experience

Fall or spring. No credit.  
Limited to division graduate students and students who have permission of the instructor.  
Hours to be arranged. Division faculty; M. Devine, 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.

#### 619 Field of Nutrition Seminar (also Animal Science 619)

Fall or spring. No credit. S-U grades only.  
M 4:30. Faculty and guest lecturers.  
Lectures on current research in nutrition.

#### [625 Seminar in Food Habits Research

Fall. 3 credits. Limited to 12 graduate students. Prerequisite: statistics or research design course. Offered alternate years. Not offered 1983-84.  
W F 3:35. D. Sanjur.  
Emphasizes a critical review of the literature and development of a research proposal using sociological theories and techniques as applied to nutritional data.]

#### 626 Special Topics in Food

Spring. 2 credits.  
Hours to be arranged. G. Armbruster, B. A. Lewis.  
Current research related to food is reviewed in the context of basic principles and their application to the quality of food.

#### 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 food production and processing as well as toxicants in the food chain will be reviewed. May be repeated for credit with permission of the instructor.

#### 630-633 Advanced Nutrition Laboratory

Spring 1-5 credits. Limited to 12 students.  
630: T 2:30-5:30, S 9-12. 631-633: T R 2:15-5:15. Division faculty.  
Study of the anthropometric, dietary, clinical, and biochemical assessment of human nutritional status. The individual courses are taught in sequence over the entire semester. Any or all of the modules may be taken for credit.

**630 Anthropometric Assessment** 1 credit

Prerequisites: NS 331 or equivalent and permission of instructor.

T 2:30–5:30, S 9–12. J. Haas.

Study of methods and procedures for anthropometric, radiographic, and energetic assessment of children and adults in clinical, research, and survey settings.

**631 Dietary Assessment** 1 credit. Prerequisites: statistics and NS 331 or equivalent, and permission of instructor.

T R 2:15–5:15. D. Sanjur.

Study of methods and techniques for assessing dietary intakes at the individual and household levels.

**632 Clinical Assessment** 1 credit. Prerequisites: NS 630, 631, 441, Biological Sciences 330 or 331, either NS 332 or Biological Sciences 430, and permission of instructor.

T R 2:15–5:15. V. Utermohlen and division faculty.

Study of methods and techniques for clinical assessment of nutritional status and diagnosis of nutritional disorders.

**633 Biochemical Assessment** Weeks 9–14; interested students must enroll with the instructor during the first 2 weeks of the term. 2 credits. Prerequisites: NS 331, Biological Sciences 330 or 331, either NS 332 or Biological Sciences 430, a course in human physiology, and permission of instructor.

T R 2:15–5:15. M. N. Kazarinoff and division faculty.

Biochemical assessment of nutritional status. Experiments are selected to exemplify measurements of intake, use, and output of primary nutrients and their metabolites.

**634 Vitamins and Coenzymes (also Biological Sciences 634)** Spring. 2 credits. Prerequisites: organic chemistry 253 or 357–358 and Biological Sciences 331 or 330, or their equivalents in biochemistry. Offered alternate years.

T R 10:10. M. N. Kazarinoff.

The chemical, biochemical, and nutritional aspects of the vitamins and coenzymes.

**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.

T R 9:05. M. Watford.

Lectures only. The identification and characterization of regulatory steps in metabolism is considered from both theoretical and practical aspects. The intracellular mechanisms of regulation are stressed, with specific examples examined in detail.

**[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 and staff.

The elements and dynamics of energy metabolism in higher animals are systematically developed through biochemical characterizations of the metabolic components and structure of major tissues and organs, stressing correlations with physiologic functions. Mechanisms that control energy metabolism within individual tissues and coordinate these processes in the intact animal are analyzed in the contexts of selected physiologic and pathologic stresses.]

**637 Epidemiology of Nutrition** Spring. 3 credits. Limited to graduate students. Prerequisite: permission of instructor. S-U grades optional.

Hours to be announced. J-P. Habicht, J. B. Mason.

Course covers basic principles of nutritional epidemiology, evaluation, and surveillance. The concept of nutrition as a determinant of health, the evidence required to support conclusions on causality, and confounding are examined. This

provides a basis for describing the principles and practice of nutritional surveillance, with emphasis on its relation to planning decisions to alleviate malnutrition in developing countries.

**638 Epidemiology of Nutrition** Fall. 2 credits. Limited to graduate students. Prerequisites: Statistics and Biometry 602 or 604 or equivalent; NS 331, 441, 601, 603, 630, and 631, or equivalent; and permission of instructor. S-U grades optional.

Hours to be arranged. J-P. Habicht.

In the context of designing and evaluating population interventions to improve protein-calorie nutrition, students review past evidence of effectiveness and efficiency of intervention, attempt to quantify sensitivity and specificity of outcome measures, and design methods to improve interventions and evaluations.

**645 Seminar on United States Nutritional Services and Programs** Spring. 2 credits. Limited to graduate students with a major or minor in human nutrition. S-U grades optional.

M W F 11:15. Staff.

Participants attend two NS 445 lectures and a seminar hour where they are guided in the study and discussion of United States food and nutrition programs and community settings for delivery of nutrition and health services. Participants will be responsible for preparing and presenting relevant material in class.

**646 Seminar in Physicochemical Aspects of Food** Fall or spring. 1–3 credits. Prerequisite: a college course in organic chemistry or biochemistry. S-U grades optional.

T R 9:05; disc to be arranged. Fall: B. Lewis; spring, 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 246 as a basis for supplementary readings and critical review of research on selected topics.

**649 Geriatric Nutrition** Spring. 3 credits.

Prerequisite: NS 331. Letter grade only.

M W F 10:10, plus 20 hours during the semester working with elderly individuals in the Ithaca area. D. Roe.

Emphasis is given to effects of aging, particularly as these change food habits, alter digestive processes, or decrease nutrient utilization. Causes of nutrient overload and nutritional deficiency are described. Nutritional assessment of elderly people is explained, together with precautions that must be taken in interpreting findings. Consideration is given to geriatric nutrition as a major responsibility of nutritionists working in hospitals, extended-care facilities, and community programs. Therapeutic aims considered are the provision of nutritional rehabilitation in acute-care hospitals and specific diet therapy for chronic-disease patients. Community program objectives are discussed, including establishment and maintenance of feeding programs for the elderly.

**650 Clinical and 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. Endemic nutritional problems (such as obesity, dental caries, and anemias) of public health importance in the United States are discussed. Student presentations are made in class. Limited field experience is offered.

**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.

The relationship between nutrition and the effects of foreign chemicals. Students are offered an

overall view of compounds to which we are exposed, including natural food toxicants, food additives, water pollutants, pesticide residues, and radioactive wastes, as well as medications and illegal drugs. A factual and scientific background is developed so students can interpret information and misinformation circulated in the news media.

**652 Nutrition Counseling** Spring. Meets 2½ hours during each of the first 11 weeks of the semester. 2 credits. Limited to students in the Clinical Nutrition Program. Prerequisites: NS 441, 442, and permission of instructor. S-U grades only.

Hours to be arranged. J. Koch.

Principles and procedures of nutritional counseling in clinical practice. Emphasis on subject matter and process skills necessary to develop, implement, and evaluate nutritional care plans for individuals and groups. Includes workshops, simulation techniques, and work with clients in selected settings.

**[659 The Nutrition and Physiology of Mineral Elements (also Veterinary Medicine 759)]** Fall.

2 credits. Prerequisites: basic physiology, intermediate biochemistry, and general nutrition. Offered alternate years. Not offered 1983–84.

T R 9:05. R. Schwartz, D. VanCampen,

R. Wasserman.

Lectures on nutritional aspects and physiological, biochemical, and hormonal relationships of the prominent macro- and microelements, with emphasis on recent developments. Included is information on methodologies of mineral research and the chemistry of ions and complexes as well as essentiality, requirements, transport, functions, homeostasis, interrelationship, and toxicity of various mineral elements.]

**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 the student who wants 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.

**669 Field Seminar** Spring; offered during January intersession or immediately following final examinations spring semester. 1 credit. Limited to 12 students. Required for graduate students in clinical nutrition. Open to other graduate students in nutrition with permission of instructor.

J. Rivers, M. Devine, R. Holmes.

Overview of policy decision making and implementation of nutrition programs at the state and national levels. Seminars alternate between Washington, D.C., (even years) and Albany, New York, (odd years). Provides opportunities to meet and confer with staff members of selected governmental and private agencies. Upon return to campus, an integrated summary report is required prior to group discussion.

**670 Clinical Field Studies** Fall, spring, summer. 15 credits maximum. Limited to graduate students in clinical nutrition. Prerequisites: NS 441, 442, 652, 630, 631, 632, and 633. S-U grades only.

Full-time study at off-campus clinical sites.

R. Holmes, V. Utermohlen, J. Rivers.

The delivery of nutritional care in hospitals, outpatient clinics, and community settings.

**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.

**[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 (even-numbered) years. Not offered 1983-84.

M 12:20-2:15. 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 gastroenteritis. Format is lecture-demonstration-laboratory.]

**[682 Isotope Kinetics (also Biological Sciences 752)]** Spring. 2 credits. Prerequisite: calculus. S-U grades optional. Offered alternate years. Not offered 1983-84.

T 7:30-9:30 p.m. D. Zilversmit.  
Quantitative analysis of the transport and distribution of nutrients, metabolites, and drugs in multicompartmental systems. The material will be presented as lectures, discussion groups, and assignments.]

**[690 Seminar on Nutrition and Behavior (also Psychology 690)]** Spring. 3 credits. Limited to 25 students. Prerequisite: a course in psychology and NS 361 and permission of the instructor. S-U grades optional. Offered alternate years. Not offered 1983-84.

T R 10:10-11:25. D. Levitsky.  
The seminar this year covers several current topics in nutrition and behavior. These topics include early nutritional insult and mental development, malnutrition and behavior, nutrition and learning, food additives and hyperkinesis, megavitamin therapy, inborn metabolic defects and mental illness, nutrition and depression, and hypoglycemia.]

**695 Seminar in International Nutrition and Development Policy** Spring. 2 credits. Prerequisite: NS 680 or equivalent. S-U grades optional.

Hours to be announced. M. Latham and division faculty.  
The role of nutrition in national development. Emphasis is on the interdisciplinary nature of the programs and policies needed to solve the food and nutrition problems of low-income countries and communities. Planning of programs and evaluation of alternate strategies designed to improve nutrition are discussed, using examples from particular countries.

**699 Special Topics in International Nutrition** Fall and spring. 3 credits maximum each term.

Registration by permission of the instructor.  
International nutrition faculty.  
This option is designed for the graduate student who wants to become familiar with some specific topic related to international nutrition. The instruction usually consists of individual tutorial study involving extensive use of existing literature. In certain semesters it may consist of a lecture or seminar course on a subject such as nutrition and parasitology or the nutritional problems of some geographic region. On occasions it may involve laboratory or field studies. Because the topics may change, this course may be repeated for credit.

**702 Seminar in Nutritional 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. Included are presentations of basic research studies as well as fundamental concepts and research activities involving

environmental problems of a toxicological nature. Presentations are given by Cornell and visiting speakers.

**703 Seminar in Nutritional Science** Fall or spring. 1 credit. S-U grades only.

T 12:20 or W 12:20. Division faculty.

**899 Master's Thesis and Research** Fall or spring. Credit to be arranged. Prerequisite: permission of the chairperson of the graduate committee and the instructor. S-U grades optional.

Hours to be arranged. Division graduate faculty.

**999 Doctoral Thesis and Research** Fall or spring. Credit to be arranged. Prerequisite: permission of the chairperson 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.  
Brink, Muriel S., M.S., Michigan State U. Assoc. Prof.  
Campbell, T. Colin, 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.  
Devine, Marjorie M., Ph.D., Cornell U. Prof.  
Gillespie, Ardyth, Ph.D., Iowa State U. Asst. Prof.  
Haas, Jere D., Ph.D., Pennsylvania State U. Assoc. Prof.  
Habicht, Jean-Pierre, Ph.D., Massachusetts Inst. of Technology. James Jamison Professor of Nutritional Epidemiology  
Kazarinoff, Michael N., Ph.D., Cornell U. Asst. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology  
Klippstein, Ruth N., M.S., Michigan State U. Prof.  
Kumanyika, Shiriki K., Ph.D., Cornell U. Asst. Prof.  
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.  
Mason, John, Ph.D., U. of Cambridge (England). Senior Research Assoc.  
Mondy, Nell I., Ph.D., Cornell U. Prof.  
Morrison, Mary A., Ph.D., U. of Wisconsin. Prof.  
Nesheim, Malden C., Ph.D., Cornell U. Prof.  
Olson, Christine M., Ph.D., U. of Wisconsin. Assoc. Prof.  
Parker, Robert S., Ph.D., Oregon State University. Asst. Prof.  
Rivers, Jerry M., Ph.D., Pennsylvania State U. Prof.  
Rivlin, Richard S., M.D., Harvard U. Adjunct 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.  
Stephenson, Lani, Ph.D., Cornell University. Visiting Asst. Prof.  
Stipanuk, Martha H., Ph.D., U. of Wisconsin. Asst. 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  
Watford, Malcolm, Ph.D., U. of Oxford (England). Asst. Prof.  
Wright, Lemuel D., Ph.D., Oregon State Coll. Prof. Emeritus  
Zilversmit, Donald B., Ph.D., U. of California. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology

## Joint Appointees

Apgar, B. Jean, Visiting Asst. Prof., U.S. Plant, Soil, and Nutrition Laboratory/Nutritional Sciences  
Austic, Richard E., Assoc. Prof., Poultry Science/Nutritional Sciences  
Bauman, Dale, Assoc. Prof., Animal Science/Nutritional Sciences  
Combs, Gerald F., Jr., Assoc. Prof., Poultry Science/Nutritional Sciences  
Krook, Lennart P., Prof., New York State College of Veterinary Medicine/Nutritional Sciences  
Miller, Dennis, Asst. Prof., Food Science/Nutritional Sciences  
VanCampen, Darrell R., Assoc. Prof., U.S. Plant, Soil, and Nutrition Laboratory/Nutritional Sciences  
VanSoest, Peter J., Prof., Animal Science/Nutritional Sciences  
Warner, Richard G., Prof., Animal Science/Nutritional Sciences  
Wasserman, Robert H., Prof., New York State College of Veterinary Medicine/Nutritional Sciences  
Young, Robert J., Prof., Animal Science/Nutritional Sciences



## Officer Education

Lieutenant Colonel David J. Boyle, Infantry, United States Army, Professor of Military Science and Commanding Officer, United States Army ROTC Detachment

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 1916, and the evolution of a program that de-emphasizes drill and formations and places greater stress on the development of leadership and managerial skills. Throughout the years Cornell's program of officer education has provided many outstanding civilian and military leaders well equipped for success as a result of knowledge and skills gained from their involvement in the Officer Education Program while pursuing undergraduate and graduate degrees.

The programs of officer education allow the student to prepare for a commission as an officer in either the United States Army, Navy, Marines, or Air Force. 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 David J. Boyle, Infantry, United States Army, Professor of Military Science and Commanding Officer, U.S. Army ROTC Detachment

Major Richard L. Slinkard, Adjutant General Corps, United States Army  
Captain James R. Patton, Adjutant General Corps, United States Army  
Captain Gary S. Terhune, Chemical Corps, United States Army

### United States Army ROTC Program

The primary objective of the Army Officer Education Program at Cornell is to develop and commission men and women who have the qualifications and potential for service as officers in the reserve and active components 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. However, a two-year program is available and is discussed in a later section. 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 a 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 most of 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 and will receive certificates acknowledging completion of the course but do not receive commissions.)

An applicant's vision must be correctable to a minimum of 20/20 in one eye and 20/400 in the other eye. Height must be at least sixty inches for men, fifty-eight inches for women, and no more than eighty inches for men and seventy-two inches for women, although exceptions will be considered. The weight requirement varies according to height and sex. Overall sound mental and physical condition is essential, and students are required to undergo periodic physical examinations. Enrollment 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 pursue the Basic Phase (Mil S I and II) during the first two years, and during the next two years the Advanced Phase (Mil S III and IV). A total of twelve credits of military subjects is required. In addition, a number of non-officer-education academic-enrichment subjects are recommended. These enrichment courses are in such fields as communication arts, psychology, sociology, political science, mathematics, and philosophy. Specific requirements are determined by the student and his or her adviser after initial enrollment. Throughout the years, cadets spend an additional 1½ hours each week each semester in practical leadership training for which there is no academic credit. All cadets attend a six-week camp, with pay, between the junior and senior years.

#### Basic Phase (Mil S I and Mil S II)

Students in the first year of the Basic Phase take one classroom course in military science in the fall and spring semesters, for which they receive academic credit. These courses include study of the United States organization for defense, principles and techniques of leadership and management, the evolution of warfare, and the nature of armed conflict in society. Students also participate in leadership modules that include rappelling, orienteering, and rifle marksmanship. They are designed to promote personal development and enrichment. While these activities do not receive academic credit, students can elect to receive physical education credit. Typical freshman participation in Army Officer Education is 48½ program-related hours.

During the fall of the second year the student takes a three-credit class in military history. In the spring the student takes a one-credit course in map reading and spends approximately two hours a week in practical leadership training as preparation for the Advanced Phase.

#### Advanced Phase (Mil S III and Mil S IV)

The Advanced Phase of the Four-Year Program is open to students who have successfully completed the Basic Phase 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 basic summer programs (see the description of the Two-Year Program) or prior military training. Any student entering the Advanced Phase

must have two years of academic work remaining at Cornell or another degree-granting institution. The student 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 Phase, they execute a written contract with the United States government. Under terms of the contract, they agree to complete the Advanced Phase 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 Phase 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 2½ 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.

### Two-Year Program

The Two-Year Program consists of the last two years (the Advanced Phase) of the regular Four-Year Program. In order to qualify for the Two-Year Program a student must successfully complete a basic six-week summer camp.

The Two-Year Program is open to selected students who have two years of academic study remaining at Cornell or any other degree-granting institution. Applications are accepted from December to April. Selectees complete the basic six-week camp or the three-week summer officer education program before registering in the Advanced Phase the following fall. They must also meet specified physical requirements and execute the same written contract as those students who enter the Advanced Phase after completing the regular Basic Phase.

### Scholarships

Scholarships are awarded on the basis of merit and are available for one, two, three, or four years. AROTC scholarships are awarded each year to outstanding Basic Camp participants and students in the freshman, sophomore, and junior classes. Cadets who are awarded scholarships continue to receive support until graduation as long as they fulfill the requirements. The active duty requirement for all scholarship students is four years.

Scholarship cadets receive funding for University tuition, required fees, required textbooks, and classroom materials for the duration of their scholarship. Basic-course scholarship cadets also receive \$100 a month for up to ten months a year.

### Commissioning

All students who successfully complete the Advanced Phase, including the advanced summer camp, are commissioned as second lieutenants in the United States Army Reserve or the Regular Army upon graduation.

### Distinguished Military Graduates

Selected senior cadets with high academic achievement and outstanding military qualities are designated Distinguished Military Graduates (DMG). All cadets, scholarship and nonscholarship, are eligible to compete. DMGs may be commissioned in the Regular Army rather than the Army Reserve; those who are so commissioned enter the Army on the same basis as graduates of the United States Military Academy at West Point.

### Service Obligations

A variety of active duty and reserve combinations are available. Nonscholarship cadets must spend either three years on active duty and three more years on

Reserve status, or three to six months on active duty followed by membership in Reserve units for six years. The manpower requirements of the Army determine the proportion of officers who serve in each category. Current trends indicate that requests for active duty for three years by nonscholarship, non-Regular Army officers will be approved.

However, it is a competitive process. Similarly, requests for limited active duty (three to six months for training only) are selectively approved. An officer beginning three years active duty first attends the Basic Officer Course (normally eight to twelve weeks) of the assigned branch. Upon completion of this course the officer is assigned to a unit and location that is determined by the desires of the individual and requirements of the Army. Those officers selected for three to six months attend the Basic Officer 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 three years in Reserve status.

Every scholarship cadet (whether commissioned in the Regular Army or the Reserve) serves four years on active duty and two years on Reserve status.

### Choice of Branch

Cadets in the second year of the Advanced Phase (normally the senior year) may specify the branch of the Army—such as Infantry, Corps of Engineers, Armor, Signal Corps, Artillery, Air Defense, Ordnance, Chemical, Adjutant General, Judge Advocate General, 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 may be granted to individuals who want to attend graduate school at their own expense after commissioning. Current policy is to approve all requests for active duty deferment for graduate school for two years (three years for law school). Requests for longer deferments will be considered on an individual basis.

### Benefits

Each cadet in the Advanced Phase (Mil S III and Mil S IV) receives \$100 a month for ten months a year. While attending the advanced summer camp (between the junior and senior years), each cadet receives approximately \$550 and an allowance for travel to and from camp. Uniforms, textbooks, and supplies required for AROTC instruction are provided by the Army.

A cadet in the Two-Year Program receives the same payments as cadets in the Advanced Phase and, in addition, receives approximately \$450 and a travel allowance for basic summer camp attendance before entering the Advanced Phase.

### Military Science Courses

All cadets take one course or a module or both 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. Students in the Four-Year Program are required to take courses as noted below. Students in the Two-Year Program are required to take all of the courses listed for the junior and senior year.

#### Freshman Year (Mil S I)

**Mil S 101 United States Organization for Defense** Fall. 1 credit. Required.

Staff.  
Students examine the United States defense apparatus 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 Social and Organizational Psychology in the Military Environment** Spring. 1 credit. Required.

Staff.  
This course allows the student 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 211 Armed Conflict and Society** Fall. 3 credits. Required.

3 classes each week. Presentation by Army, Marine Corps, and Navy 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.

**Mil S 221 Mapping: Land Navigation** Spring. 1 credit. Required.

Staff.  
This course provides practical knowledge of the various forms of topographic representation. Students develop, interpret, and use maps in terrain association and land navigation. Knowledge of topography is complemented by an orientation on significant environmental influences from political, social, and climatic factors. Portions of the course offer practical experience in land navigation and orienteering.

#### Junior Year (Mil S III)

**Mil S 332 Theory and Dynamics of the Military Team** Fall. 2 credits. Required.

Staff.  
After an initial introduction to techniques of presenting briefings, the student is 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, the student has 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 322 Leadership in Small-Unit Operations** Spring. 2 credits. Required.

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 the leader's decisions; the processes of planning, coordinating, and directing the operations of military units to include troop-leading procedures; and development of operation plans and orders.

#### Senior Year (Mil S IV)

**Mil S 424 Contemporary Military Environment I** Fall. 2 credits. Required.

Staff.

A detailed examination of the functions and activities of military organizations, their commanders, and their staff. Discussion focuses on students' past experiences and future expectations in examining such aspects of the military environment as the chain of command, decision making, command and staff-relations actions, and the various elements of small-unit administration.

**Mil S 461 Contemporary Military Environment II** Spring. 2 credits. Required.

Staff.  
As a continuation of the material presented in Mil S 424, students examine carefully the leadership environment of an Army officer. Conferences and seminars are used to examine the techniques of effective military leadership, the sociological and psychological environment, the nature of military law, and above all, the professional ethics, responsibilities, and obligations of an Army officer.

### Practical Leadership Training

#### All Army Officer-Education Students

All Advanced Phase AROTC students and Basic Phase students belong to a cadet organization for the purpose of participation in practical leadership experiences. The cadet organization meets formally for 1½ hours each week as part of the leadership laboratory program.

The rationale for the form and content of the program is the fact that continued exposure to leadership situations that are both mentally and physically challenging will develop poise and self-confidence. The practical result for the individual participant is the ability to apply intelligently and creatively the decision-making process to a variety of complex situations, while simultaneously supervising the performance of others.

Training of this nature enables students to learn how to communicate effectively with peers, subordinates, and superiors. Most importantly, the program helps instill in each participant a heightened awareness of the roles that character traits such as integrity, cooperation, devotion to duty, and professionalism play in the smooth operation of any organization.

In the leadership laboratory, all of these objectives are accomplished by emphasizing practical exercises and firsthand experience. Types of practical laboratory activities include an introduction to rifle marksmanship, mountaineering, physical training, land navigation and orienteering, signal communications, tactics, and orientation and training exercises at military installations.

As with many laboratory periods, no credit is given, and participation is required for successful completion of the AROTC program. Students register as follows:

#### Mil S I Leadership Laboratory I

Fall	Spring
Mil S 141	Mil S 142

Mil S 1 cadets select either rifle marksmanship, orienteering, or rappelling. These interesting and challenging activities do not provide academic credit but may be used for physical education credit if adequate hours have been accrued.

#### Mil S II Leadership Laboratory II

Fall	Spring
Not offered	Mil S 242

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, and tactics and field exercises.

#### Mil S III Leadership Laboratory III

Fall	Spring
Mil S 341	Mil S 342

Cadets meet for 1½ 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 among 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 441 Mil S 442

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.

## Naval Science

Captain Donald J. Meyer, United States Navy,  
Professor of Naval Science and Commanding  
Officer, Naval ROTC Unit  
Commander Joseph M. Quigley, United States Navy  
Major Michael A. Mahoney, United States Marine  
Corps  
Lieutenant Frederick W. Weber, United States Navy  
Lieutenant Robert W. Grose, United States Navy  
Lieutenant Peter J. Campbell, United States Navy  
Lieutenant John C. Burton, 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 service. The program is compatible with most undergraduate major fields of study, including five-year baccalaureate degree programs.

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 laboratory 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 program has been designed to prepare future officers, Navy courses are open to all students at Cornell University as space limitations allow.

### Requirements for Enrollment

An applicant for Naval ROTC 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 commissioned. Waivers of the upper age limit may be granted on an individual basis by the Chief of Naval Personnel up to age twenty-nine on June 30 of the year in which commissioned. Applicants must also meet physical and medical requirements. Interested students should visit the Naval Officer Education Unit in Barton Hall.

### Programs

There are two types of Navy programs: the Scholarship Program and the College Program. They differ primarily in benefits to the student and type of commission earned.

## Scholarship Program

The Naval Officer Education Program provides six thousand scholarships in over fifty-five 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 commission in the Regular Navy or Marine Corps. At Cornell University over 90 percent of naval students have a scholarship. In the past, of those students who have entered the Cornell program without a scholarship, more than 80 percent have been successful in obtaining one.

### 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 NROTC colleges or universities throughout the country.

*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 year in the program.

*Third*, by entering through one of the Two-Year College Programs.

### College Programs

There are two College Programs available. Both lead to a commission in the Naval or Marine Corps Reserve and three years of active duty.

Each of these programs provides textbooks for naval professional courses, uniforms, and a subsistence allowance of \$100 a month from the beginning of the junior year.

The regular College Program is three to four years long. Academic requirements for students in this program are somewhat less than those for scholarship students, as noted in the curriculum section.

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 *Sorcery*, or with a naval activity anywhere in the world for on-the-job training. College Program students attend at least one summer training session of the same duration between the junior and senior years. While attending summer training sessions, midshipmen are paid approximately \$400 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 six years, in pay grade E-1 (seamen recruit), before to being appointed midshipman, USNR, and receiving compensation. Students that are disenrolled from the NROTC Navy-Marine Corps Scholarship Program for reasons beyond their control shall, upon disenrollment, be discharged from their enlisted status. It should be understood that two years active enlisted service or restitution of benefits received will be required of

those students who default from the terms of their NROTC contract after the beginning of their sophomore year. Additionally, two years active enlisted service is incurred at any time for those individuals who are released from active duty specifically to participate in the NROTC scholarship program and do not complete such training.

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 three years on active duty. Specialized training 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-power engineering for surface ships and submarines, naval aviation, and large and small surface ships.

## Marine Corps Options

The United States Marine Corps is an integral part of the Naval Service 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 as 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 courses by a Marine officer instructor. For the first class summer-cruise (after the junior year), known as the Bulldog Cruise, 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 educational 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 in the Naval Officer Education Program. The first of these requirements is a weekly naval professional laboratory 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 naval program participate in one ninety-minute laboratory session each week. The session is held from 2:30 until 4:00 on Wednesday afternoon. This period is planned and implemented for the most part by the midshipmen officers in the battalion organization and consists of both drill and professional information briefings and underway training aboard the unit's seagoing sail-training ketch

or five small sailboats. 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 only the amphibious warfare course in either their junior or senior year, depending on when the course is offered. The number of hours a week spent in the classroom varies semester to semester, as does the credit received for each course.

### Freshman Year

**Nav S 101 Fundamentals of Naval Science** Fall. No credit.

Lec-rec, 1 hour each week. Navy staff.  
A study of fundamental aspects of naval science, including its conceptual contributions to sea power, factors involved in the physical development of naval forces; resources which must be managed, and prospects for the future.

**Nav S 102 (also Mechanical and Aerospace Engineering 101) Naval Ship Systems** Spring. 3 credits.

Lec-recs, 3 classes each week. R. L. Wehe.  
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.

### Sophomore Year

**Nav S 201 Naval Weapons Systems** Fall. 3 credits. Prerequisites: Mathematics 192 or 112 and Physics 208 or 214.

Lec-recs, MWF 8. Navy staff.  
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. The latter part of the course covers the formal derivation of the fire-control problem and development of an algorithmic solution method applicable to the digital computer.

**Nav S 202 Seapower—History of the Navy** Spring. 2 credits.

Sems, 2 each week. Navy staff.  
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.

### Junior Year (Navy)

**Nav S 321 Naval Operations** Fall. No credit. 1 hour each week. Navy staff.

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.

**Nav S 305 (also Agricultural Engineering 305) Principles of Navigation** Spring. 4 credits.

Lec-rec-project work, four classes each week. 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, electronic navigation systems, and air navigation.

### Senior Year (Navy)

**Nav S 431 (also Hotel Administration 414) Organizational Behavior and Small Group Processes** Fall or spring. 3 credits.

Current research is examined to provide a conceptual framework for understanding group processes within organizations. In addition, students participate in experimental laboratories aimed at enhancing their effectiveness as members or leaders of groups. Topics include stages of group development, leadership, decision making, motivation, individual versus group needs, organizational communication, power, and organizational change.

**Nav S 432 Naval Administration Topics** Spring. No credit.

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 his own understanding of naval administration and for use in the role of the division officer in counseling his subordinates. Through the use of lectures, situation problems, and role playing, the student will learn about the various aspects of Navy management and administration.

### Additional Required Course

This course may be taken at any time during a student's undergraduate academic career.

**Nav S 302 Armed Conflict and Society** Fall. 3 credits.

3 classes each week. Presentations by Marine Corps and Navy 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.

### Junior or Senior Year (Marines)

**Nav S 311 Amphibious Warfare** Spring. 3 credits. Lec-recs, 3 each week. Marine Corps staff.

The history of the development, theory, techniques, and conduct of amphibious operations in the twentieth century. Special emphasis will be on amphibious operations conducted in the central Pacific during World War II.

## Other Required Courses

### Navy Option

In order to receive commissions in the United States Navy, midshipmen must complete all the requirements for a baccalaureate degree as well as certain academic requirements specified by the Navy. Study in engineering and scientific fields is required for a majority of Navy-option scholarship students. Specifically, 80 percent of the Navy-option scholarship students are encouraged to pursue majors in engineering and approved sciences (chemistry, mathematics, physics, computer science, oceanography, operations analysis, or the physical sciences) to meet the technological requirements of the modern Navy. Other fields of study for majors leading to a baccalaureate degree and having a direct applicability for the unrestricted line are permitted with the approval of the professor of naval

science. Academic majors in fields that show a career interest apparently antithetical to a career in the unrestricted line (for example, agronomy, art, floriculture, music, physical education, predoctoral studies, theology, or wildlife management) are precluded for Navy-option scholarship students. Because of changing terminology for academic fields of study, it is not practical to provide a complete list of authorized and unauthorized majors. Examples of fields of academic study of interest to the Navy for educating officers of the unrestricted line are:

Asian studies	management
chemistry	mathematics
computer science	oceanography
economics	operations analysis
engineering	physical sciences
European studies	physics
foreign affairs	public administration
history	Soviet studies
Latin American studies	

Although there are few restrictions placed upon Navy-option College Program students (or any Marine-option students) with respect to academic majors, it is important to understand the vital need for mathematics and science in the modern Navy. College Program students who want to compete for a scholarship are encouraged to select majors in those fields listed above.

Other required courses depend on the commissioning program in which the Navy-option midshipmen are enrolled and are given in the following sections.

### Scholarship Program Navy-Option Students

All Navy-option scholarship students must complete two semesters of science-level calculus (six credits minimum) by the end of the sophomore year and two semesters of calculus-based physics (six credits minimum) by the end of the junior year.

Scholarship Program Navy-option students who do not major in chemistry, engineering, mathematics, physics, computer science, oceanography, operations analysis, or the physical sciences must also complete two science or engineering courses as electives.

### College Program Navy-Option Students

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 Professor of Naval Science (PNS) scholarship.

### Marine Option

Any Navy 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 one hour each week and take two naval science courses. In addition, two semesters of any courses (a minimum of three hours each) in the following subject areas are required, the intent being to broaden the base of knowledge of the individual. The specific course chosen must be approved by a Marine Officer Instructor (MOI).

anthropology
behavioral sciences
communication methods
computer science (upper level)
economics
geography
languages
management engineering
philosophy
political science
sociology
world history

## University Courses

A wide range of courses satisfy Naval ROTC science and engineering electives or social sciences and humanities requirements. Students should consult their naval science instructor or 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, 192, or 194 Calculus for Engineers

### Physics

Phys 112 and 213 or 217  
Phys 207-208 Fundamentals of Physics

### Chemistry

Chem 103-104 Introduction to Chemistry  
Chem 207-208 General Chemistry  
H Adm 171-172 Food Chemistry

### Computer Sciences

Engr 105 Introduction to Computer Programming  
Com S 101 The Computer Age  
Com S 102 Introduction to FORTRAN Programming  
Com S 211 Computers and Programming  
Com S 314 Introduction to Computer Systems and Organization  
M&AE 389 Computer-aided Design  
Com S 436 Introduction to Computers in Planning  
H Adm 114 Information Systems I  
Ag En 151 Introduction to Agricultural Engineering and Computing  
Ag En 152 Engineering Drawing  
I&LR 211 Economic and Social Statistics

## Extracurricular Activities

The Navy ROTC student 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 *Sorcery* to distant ports of call. Back at Cayuga Lake, a highly respected sail-training program offers instruction, both in small sailboats and in large-boat sailing on board *Sorcery*, to all who want to participate. The unit offers a comprehensive sports program in which most midshipmen participate. The Navy unit has won the Independent Division All Sports Trophy for four of the last five years. Midshipmen participate in a myriad of social events, including the annual Navy ball, the Tri-Service military ball, and traditional naval mess nights.

## Department of Aerospace Studies

Colonel John M. Kubiak, United States Air Force,  
Professor of Aerospace Studies and Commander,  
Air Force ROTC Detachment 520  
Major Paul H. Wendzikowski, United States Air Force  
Captain Michael R. McFarren, United States Air Force  
Captain Paul A. Gifford, 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 provide the student with a background of aerospace knowledge and to further develop qualities of leadership, integrity, and self-discipline. The objectives are achieved through four-year and two-year programs. These programs include specific courses in aerospace studies and practical laboratories.

Entering students are assigned to one of four categories: flying (pilot-navigator), missile, engineering-science, and general service. These assignments are based on the student's preferences, qualifications, 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 the physical requirements listed below.

Though the program is designed to prepare future Air Force officers; Department of Aerospace Studies courses are open to all students at Cornell.

## Physical Requirements

Every applicant must be free from any limiting physical infirmity and must have normal hearing, blood pressure, and heartbeat. Weight must be normal for height and age.

Following are the additional specific requirements for nonflying categories.

*Vision:* bilateral distant vision without corrective lenses, at least 20/400.

*Height:* for men, at least sixty but not more than eighty inches; for women, at least fifty-eight but not more than seventy-two inches.

*Allergy:* no history of asthma since twelfth birthday.

*Dental health:* good.

Those students who are interested in qualifying for flying categories (pilot or navigator) must meet the following specific requirements:

*Vision:* (for pilot candidates) 20/20 bilateral near and far vision without corrective lenses; (for navigator candidates) bilateral near vision at least 20/20 without corrective lenses and bilateral far vision at least 20/70 without correction, providing it is correctable to 20/20 with lenses.

*Color vision:* normal.

*Height:* at least sixty-four but not more than seventy-six inches; sitting height not more than thirty-nine inches.

*Allergy:* no history of allergy or hay fever since twelfth birthday.

*Dental health:* good.

## 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 United States 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 Basic Program (first two years) and the Professional Officer Course (advanced program) during the junior and senior years. The Basic Program carries no military commitment and students may withdraw at any time during that period.

### Basic Program

Students in the Basic Program take one credit of classroom work offered by the Department of Aerospace Studies each semester. During the freshman year the role of the United States military forces in the contemporary world is examined with emphasis on human rights and the organization and mission of the United States Air Force. The functions

of strategic offensive and defensive forces, general-purpose forces, and aerospace support forces are covered. In the sophomore year, the history and development of military aviation and American air power are studied.

Students also spend one hour a week in a leadership laboratory, which includes classroom instruction in responsibilities and the environment of the junior officer, and instruction and practice in basic drill and ceremonies. 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 Air Force Reserve upon 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 place of the military in American society. Leadership laboratory requires a minimum of one hour a week in the junior and senior years. In the leadership laboratory the cadet is exposed to advanced leadership experiences and applies principles of management learned in the classroom.

## Flight Instruction Program

All cadets accepted for pilot training participate, in their senior year, in the Air Force ROTC flight instruction program at no cost.

This program consists of ground school and twenty-five hours of flying training in a light aircraft. Instruction is provided by a local civilian flying school. Upon completion of the program a cadet may continue training for a private pilot's license through the Federal Aviation Agency.

## Two-Year Program

The Two-Year Program consists of the last two years (the 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 male and female 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 November through May of the 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

The Air Force awards more than six thousand scholarships annually. Four-year AFROTC scholarships are awarded to selected high school seniors. Three- and two-year scholarships are awarded annually on a competitive basis to students enrolled in the Air Force Officer Education Program. Applicants for the Two-Year Program are also eligible to be considered for scholarships. Financial status or the award of other scholarships does not disqualify applicants for AFROTC scholarship awards. Acceptance of an AFROTC scholarship does not commit an individual to serve any additional time on active duty with the Air Force.

The vast majority of two-, three-, and four-year scholarships are limited to students majoring in engineering, physics, mathematics, computer science, and atmospheric science. A limited number



of four-year scholarships are available to those enrolled in nontechnical academic majors such as business administration, accounting, and foreign languages. Some two- and three-year scholarships are awarded to students in nontechnical academic majors who desire to become navigators or missile launch officers.

A scholarship cadet receives a \$100-a-month, tax-free subsistence allowance, all tuition, fees, and reimbursement for the cost of textbooks for the duration of the scholarship.

### Fees

A uniform deposit of \$30 is required. Students are also encouraged to contribute to a Cadet Activities Fund to cover the cost of most of their social activities.

### Benefits

All cadets in the advanced program (POC) receive a \$100-a-month, nontaxable subsistence allowance for the academic year. During the four- or six-week summer field training each cadet receives pay equal to one-half of a second lieutenant's salary, 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 field trips made to Air Force bases throughout the country. Scholarship and advanced cadets (POC) are entitled to space-available rides on all 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 of either program 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 among students through meaningful experiences. This is accomplished through the field training curriculum and associated activities. The curriculum consists of aircraft, aircrew, and survival orientation; junior officer training; physical training; small arms training; a social-action program; and supplemental training. Special emphasis is placed on career orientation and interaction with young officers in fields of interest to the student. The six-week field training program differs in that it has an additional sixty hours of academic course work similar to the sixty hours of course work taken by the Four-Year Program cadets during their freshman and sophomore years.

In addition to field training, airborne training (parachute jumping instruction) is available as an extracurricular activity to selected volunteer cadets.

### Advanced Training Program (ATP)

This program allows selected cadets to go to active-duty Air Force bases for a two- or three-week period during the summer following their junior year. As "third lieutenants," cadets receive specialized career orientation and an opportunity to experience leadership, human relations, and management challenges encountered by Air Force junior officers. Cadets also have an opportunity to become familiar with the Air Force way of life. Cadets receive pay and allowances authorized by current directives at the time of Advanced Training attendance.

### Commissioning

All students who successfully complete the AFOTC advanced program (POC) and who are awarded a baccalaureate degree are commissioned as second lieutenants in the Air Force Reserve.

### 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, aeronautics, astronautics, design and development, the biological sciences, computer design and maintenance, meteorology, or various other engineering and scientific fields. They will work under the supervision of some of the most highly qualified people in their field and have access to the latest scientific facilities and equipment.

Any undergraduate major is suitable for those who are interested and qualified to be pilots or navigators. After completion of flying training they are assigned primary duties flying various kinds of aircraft.

Officers who elect missile duty will be sent to school for training in that field. Upon completion of school they will 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 and also enjoy the extra option of enrolling in a graduate program.

Those officers graduating in the general service category can anticipate assignments in manpower management, administration, logistics, police and investigation, intelligence, personnel, transportation, information, and numerous other career fields. They will use their educational backgrounds in positions of responsibility and be given the opportunity to develop further their managerial and administrative skills.

### Service Obligations

Second lieutenants commissioned in nonflying categories are required to serve on active duty for four years. Pilot trainees are required to serve on active duty for six years after completing flying training and receiving their aeronautical rating. Navigator trainees will serve five years after receiving their aeronautical rating. Some newly commissioned officers are allowed to postpone their active service in order to remain in college and earn advanced degrees.

### Curriculum

Students in the Four-Year Program are required to take all the 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.

1 class each week. J. Pallay.

A study of current United States 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.

1 class each week plus a field trip to a local military installation. J. Pallay.

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 and defensive general-purpose and aerospace support forces throughout the world are studied.

#### Sophomore Year

**Air S 211 Development of Military Aviation** Fall. 1 credit.

1 class each week. P. H. Wendzikowski.

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, and the development of pre-World War II aircraft and the political struggles for an independent United States 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.

1 class each week. P. H. Wendzikowski.

The employment of the Air Force since World War II in military and nonmilitary operations to support national objectives. Effects of technology on defense policy and strategy are reviewed. The part played by the air arm 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 are examined from the viewpoint of technology and tactical doctrine.

#### Junior Year

**Air S 331 Leadership and Communicative Skills** Fall. 3 credits.

2 or 3 classes each week. M. R. McFarren.

Leadership responsibilities at the junior officer level, including the responsibility, authority, and functions of a military commander and his staff, emphasize management research and theory. Recent approaches to leadership models and the importance of communication skills in any leadership role are considered. Case-study exercises and oral and written assignments are required.

**Air S 332 Management in the Armed Forces** Spring. 3 credits.

2 or 3 classes each week. M. R. McFarren.

Management at the junior officer level. Basic concepts of management and decision-making process, including planning, organizing, coordinating, directing, and controlling. Evaluation processes and techniques used by management are studied. Position of management in the world of power and politics, including managerial strategy and tactics, is considered. Case studies and oral and written assignments are required.

#### Senior Year

**Air S 461 National Security Forces in Contemporary American Society I** Fall. 3 credits.

2 or 3 classes each week. P. A. Gifford.

The functions and roles of the professional officer in a democratic society and how they relate to the socialization processes, prevailing public attitudes, and value orientations associated with professional military service are examined. Changes within the military are analyzed, including such topics as the all-volunteer service, race relations, and the impact of women in the armed forces. The essential features of the military justice system as it functions to protect basic human rights and organizational order are reviewed. The formation and implementation of defense policy, including political, economic, and social constraints, are studied.

**Air S 462 National Security Forces in Contemporary American Society II** Spring. 3 credits.

2 or 3 classes each week. P. A. Gifford.

A study of United States national security policy that examines the formulation, organization, and implementation of national security; the context of national security; the evolution of strategy; the management of conflict; and civil-military interaction. The course is designed to provide future Air Force officers with a background of United States national security policy so they can function effectively in today's Air Force.

**Elective Course**

**[Air S 405 Principles of Air Navigation and Aircraft Systems** Fall. 3 credits. Not offered 1983–84

2 classes each week.

Basic principles of weather elements, aerodynamics, aircraft systems, engine systems, and navigation systems. The study of these systems is integrated with chart projections, navigational aids, flight instruments, and avionics. Use of flight computer will be covered. This will prepare students for FAA Private Pilot Ground School Test ]

**Leadership Laboratory Courses**

All Air Force cadets spend at least one hour 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 (such as the fall Veteran's Day parade and the spring Military Awards Ceremony). All cadets are also expected to participate in an evening dining-in. Cadets are required to meet minimum physical fitness and weight standards once a 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 local military installation.

**Air S 241–242 Intermediate Military Experiences**

Develops skills in giving commands for drill and ceremonies. Introduction to 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 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. Relationship between Air Force Specialty Codes and academic majors. The importance of basic health habits to leadership.

**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

Michael L. Slive, director of physical education and athletics  
 Alan E. Gantert, associate director of athletics and director of physical education and intramurals  
 John R. West, assistant director of physical education  
 Barbara Alling, secretary  
 Patricia Baker, secretary

### The Program

Cornell is proud of its diversified physical education program—unique in its concept and tradition of excellence—that encompasses over seventy recreational activities, ranging from the aquatic depths of scuba diving to the heights of mountain climbing. It ranks among the five largest university programs in the nation.

Teaching emphasis in the program is placed on recreational activities that can be continued outside the University. Each member of the instructional staff has extensive experience and skill in the area he or she teaches, and all of the abundant facilities available to the athletic department are used as needed in the program.

This Announcement serves only as a guide. Dates, fees, and regulations stated herein are subject to change at any time. Students should feel free to check any information at the physical education office in Teagle Hall.

### Physical Education Requirements

All undergraduate students admitted to Cornell as freshmen must complete two terms of physical education—normally during the first two terms of attendance.

In addition, the University Faculty Committee on Physical Education has established a basic swimming qualification requirement for all entering freshman students. Normally women take the test in the Helen Newman pool, and men in the Teagle pool, as part of their physical education registration process. The test consists of a continuous seventy-five-yard swim using front, back, and optional strokes and is conducted during the first week of academic classes. All others who have to qualify should contact the physical education office in Teagle Hall (men) or Helen Newman Hall (women) to make an appointment for the swim test. Any student who cannot pass the swim test is required to include swimming in his or her program of physical education before electives can be chosen. Students will receive a grade of *Incomplete* in physical education each semester until they have passed the swim test.

Circumstances permitting exemption from, or postponement of, these requirements are outlined in the section on waiver of requirements.

### Transfer Students

Students who transfer to Cornell from another college or university will be given credit for one term of physical education for each full term of academic transfer credit they are granted by Cornell. Any transfer student entering Cornell as a sophomore or higher normally is not required to take physical

education classes for credit. Each student should clarify his or her transfer status with the appropriate college office. Transfer students subject to the credit requirement must take the swim test before signing up for an elective.

### Waiver of Requirements

A waiver or postponement of physical education requirements may be granted if the student:

1. has a physical handicap or medical affliction, certified by University medical staff, that precludes participation in any physical education activity (the department is prepared to adapt a physical education program to the individual needs of a handicapped student whenever possible); or
2. is committed to twenty hours or more of employment per week (the director of scholarship and financial aid must issue the request for exemption, certifying the necessity for such employment obligations).

Permission for postponement of, or exemption from, the physical education requirements is issued only by the University Faculty Committee on Physical Education or the director of physical education. Final authority for interpreting and ruling on requests for exemption rests with the committee.

### Course Registration

*Registration for credit for all physical education classes (for men and women) takes place in Teagle Hall gymnasium during the academic course registration period.* Dates and times are publicized with other registration information each semester. All classes for those in the required program are filled on a first-come—first-served basis. A \$25 penalty fee is charged by the physical education department for late enrollment occurring immediately after the University's posted registration periods.

Physical education courses may be dropped or added without penalty during the first three weeks of the semester; this must be done at the physical education office in Teagle Hall. In general, such changes will be allowed only if the student has a conflict caused by a change in his or her academic course schedule. Each student may make only one course change per term. The physical education department assesses a \$10 penalty fee for a course change made after the three-week drop-add period.

### Course Fees

Information about fees associated with physical education courses is available at the time of course registration (some fees cannot be set until the course meets). Course fees are not charged to the account of a student enrolled in the University until two weeks after course registration. All fees thus charged are billed through the bursar's office. Other participants in courses involving fees usually must pay when they register. Only the person paying the fee will be allowed to use the playing time allotted by the fee. Payment will be waived or refund made only if:

1. the participant withdraws from the course during the designated drop-add period (the withdrawal must be made at the physical education office in Teagle Hall);
2. the participant fails to pass preliminary course requirements; or
3. the participant accumulates a significant number of medically excused absences from the course (the director or assistant director of the physical education program will make the decision in this situation).

**Note:** All fees charged for the Greek Peak ski program are subject to the regulations of the Greek

Peak ski center. Students should refer to the information sheet supplied by Greek Peak at spring registration.

### Credit

Physical education credit is granted for:

1. satisfactory completion of a course offered through the physical education program;
2. participation on an intercollegiate team as a competitor or manager;
3. participation in the marching band;
4. satisfactory completion of a physical education course at a recognized institution provided that (a) a written request to enroll is submitted to, and approved by, the director of physical education at Cornell and (b) a transcript of the in absentia credit is forwarded to the physical education office at Cornell.

Students receive credit for one course only per term. If a student enrolls in more than one course per term, credit will be given only for the first course the student has enrolled in, as recorded in the physical education office. A grade of *Incomplete* received in a physical education course taken for credit must be made up before the end of the following term.

### Absences

Students enrolled for credit are allowed three absences (excused or unexcused) without penalty in each twelve-week course taken per term. Proportional adjustments will be made for courses lasting less than twelve weeks. Students are allowed to make up two unexcused absences in excess of the three allowed per term. Medical excuses do not constitute additional allowed absences; they are merely valid reasons for missing a class session and must be made up. A maximum of eight medical excuses (each of which must be cleared through Gannett Health Center at the time of the illness) is allowed per term. If medically excused absences exceed the three absences allowed without penalty per term, each one in excess must be made up.

### Elective Enrollment

Elective (no-credit) enrollment is allowed, and encouraged. However, an elective student is required to attend a minimum of one-half of the total number of classes given in that course. Penalty for noncompliance is a \$10 drop fee.

Faculty and staff and their spouses and dependents are welcome to participate in the physical education program whenever class space is available. A general entrance fee of \$25 is charged in addition to any specific course fees. These fees are to be paid by cash or check at the time of course registration.

### Facilities

**Teagle Hall**, at the corner of Garden Avenue and Schoellkopf Drive, is the administrative headquarters for the physical education and athletics program. Department offices (telephone: 256-4286) are in the west end of the building. Teagle contains two swimming pools, crew practice tanks, a wrestling room, a fencing room, weight-lifting rooms, an open gym floor, and a steam room. Classes in basketball, fencing, karate, lacrosse, scuba diving, softball, swimming and water safety, weight lifting, and volleyball are held here. When academic classes are in session, Teagle is open from 9:00 a.m. to 11:00 p.m. Monday through Friday, 10:00 a.m. to 6:00 p.m.

on Saturday, and noon to 6:00 p.m. on Sunday. During the summer the building is open Monday through Friday only, 9:00 a.m. to 7:00 p.m.

**Helen Newman Hall**, situated at the end of South Balch Drive, is the headquarters for the women's intercollegiate program (telephone: 256-5133). The building contains a swimming pool, dance studios, a rifle range, sixteen bowling alleys, a large open gym floor, and a sauna room. Classes in badminton, basketball, bowling, dance, fencing, physical conditioning, riflery, swimming, tennis, and volleyball are held here. When academic classes are in session, Helen Newman is open from 8:00 a.m. to 11:00 p.m. Monday through Friday, 9:00 a.m. to 5:00 p.m. on Saturday, and 10:00 a.m. to 6:00 p.m. on Sunday. During the summer it is open Monday through Friday only, 8:00 a.m. to 7:00 p.m.

**Barton Hall**, situated on Garden Avenue opposite Teagle Hall, contains a large open gym floor. Classes in badminton, first aid, hunter safety, jogging, physical fitness, volleyball, and weight control are held here.

**Lynah Rink** is used for classes in figure skating, hockey, and ice skating, as well as for public skating sessions during scheduled hours from late October until mid March.

**Schoellkopf Hall** is used for Nautilus and weight-lifting exercises. Classes in racquetball and squash are held in the **Grumman Squash Courts**, and archery and professional golf instruction are offered in **Bacon Cage**.

Other facilities used in the program include the **Oxley Polo Arena** for polo and riding instruction, **Moakley golf course** for recreational golf; the **Kite Hill indoor tennis bubble**; the Tompkins County Rod and Gun Club for skeet and trapshooting; and Greek Peak, Virgil, New York, for skiing.

Schedules for use of all athletic facilities can be obtained from the Teagle Hall and Helen Newman Hall main offices.

## Use of Facilities and Equipment

In the event conflict arises about the use of department equipment or facilities, physical education classes have priority. The director or assistant director of physical education will assign priorities when necessary.

The Department of Physical Education and Athletics is not responsible for any personal items left in any of its buildings or facilities.

## Equipment Issued to Students

All students taking classes for credit are entitled to use of a basket and combination lock. Baskets for men and women are available in Teagle Hall and are assigned to new students during academic registration. Students should pick up their combination lock when reporting for their swim test. There are baskets for women only in the main locker room in Helen Newman Hall; assignment procedures are the same as for Teagle. Baskets are issued on a first-come-first-served basis, beginning during academic registration week. Each student receives a towel when he or she attends class. There is no charge for the basket, lock, or towel, provided they are returned to the department at the appropriate time. If any of these articles is lost, the replacement cost will be charged to the student's bursar account.

Each student will provide his or her own appropriate gym uniform (socks, shorts, T-shirt, sneakers, et cetera) for class when needed. Students can rent a solid-color gym uniform for use during the term from the locker-room staff in Teagle Hall. Uniform rental at Helen Newman Hall is limited to women's swimsuits.

Students are allowed to borrow small equipment items, such as basketballs, volleyballs, skip ropes, punching-bag gloves, or horseshoes, from their locker-room equipment areas for short-term use. The student's identification card will be held by the department as security while the item is in use.

## Equipment Issued to Groups

Established campus groups may borrow certain sports equipment (e.g., volleyballs and nets but not poles; softballs and softball bases and bats) from Helen Newman and Teagle halls for up to seven days during the early fall or late spring. A deposit is required.

## Faculty-Staff Use of Facilities

Faculty and staff may become eligible to use Teagle Hall facilities by paying a yearly membership fee. Members are issued a basket and lock and are provided with a gym uniform and towel on a daily basis.

Faculty and staff may participate in any physical education class on a space-available basis; all related fees must first be paid (see Elective Enrollment).

## Use of Swimming Facilities

All students may use the swimming facilities in Teagle Hall or Helen Newman Hall between classes, during the noon hour, and at established hours during the evening and on weekends. Faculty and staff who have Teagle Hall seasonal memberships may use the Teagle pools during these periods also. Faculty and staff who do not have seasonal memberships can use the Helen Newman pool (by paying an hourly fee) or the Teagle pools during designated hours. Specific times are established each term for single-sex or coed swimming and for family swim nights. Schedules for the use of the pools are available in the main office of Teagle and Helen Newman halls.

Women using the Teagle pools must supply their own swimsuits and caps (caps are not required); they may change and shower in the locker rooms at the west end of the building, facing Barton Hall. Towels are provided. Teagle Hall does not provide hair dryers, but electrical outlets are available for use of personal dryers in the locker rooms. Swimmers using the Helen Newman pool must provide their own swimsuits and caps (required).

All persons using swimming facilities are required to take a thorough shower immediately before entering the pool and to obey the orders of the lifeguards at all times. Swimming is allowed only when a lifeguard is on duty.

## Courses

The courses and fees described in this Announcement 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. All 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.

### Badminton Fall and spring

Two classes a week, Helen Newman Hall and Teagle Hall.  
Fundamental shots, scoring, and general play.

### Basketball Fall and spring.

Two classes a week, Teagle Hall.  
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.

### Competitive Sports and Games Fall and spring

Two classes a week, Teagle Hall.  
A potpourri of games that can be used in schools and camps and on playgrounds.

### Equitation Fall and spring. Fee charged.

One class a week, Oxley Polo Arena. Class days and hours are arranged at registration.  
Instruction varies according to riding ability and experience.

### Exercise and Figure Control 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 and Conditioning Fall and spring.

Two classes a week, Helen Newman Hall and Teagle Hall.  
Physical fitness program that embodies features of stretching exercises, weight lifting, and jogging. Students work on their individual training needs.

### Fundamentals of Flying Disc Sports Fall and spring.

Two classes a week, Barton Hall.  
Several types of throws and catches are covered, as are the fundamentals of various disc sports, including Ultimate Frisbee and disc golf. Primarily designed for beginners.

### Judo Fall and spring. Fee charged for uniform.

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, Teagle Hall.  
Instruction and practice in basic skills (cradling, passing, catching, goal shooting, checking) and team play.

### Martial Arts and Aerobic Exercises Fall and spring.

Three classes a week, Teagle Hall.  
Blend of ten basic martial art techniques in a framework of rhythmic exercises.

### Nautilus Fall and spring. Enrollment limited to capacity of facilities. Fee charged.

Two classes a week, Teagle Hall.  
Advanced weight lifting on specifically designed apparatus. There are ten stations in the room.

### Racket Games Fall and spring.

Two classes a week, Teagle Hall.  
Table tennis, racquetball, squash, badminton, and deck tennis. Playing fundamentals, scoring, and rules are stressed. Interclass competition.

### Racquetball Fall and spring. Fee charged.

Two classes a week, Teagle Hall.  
Instruction at all levels. Equipment is furnished.

### Soccer Spring.

Two classes a week, Teagle Hall.  
Introduction to the game. Includes basic individual skills (passing, trapping, volleying) and team play and strategy.

**Softball** Fall

Two classes a week, Lynah Rink.

Fundamentals of each position are taught. Bats, balls, catcher's masks, and bases are provided. Interclass team competition.

**Squash** Fall and spring. Fee charged.

Two classes a week, Grumman Squash Courts. Classes for all levels of play. Equipment is furnished.

**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 for novices.

**Aquatic Courses****Beginning Swimming** Fall and spring.

Two classes a week, Helen Newman Hall and Teagle Hall.

Instruction and practice in basic skills leading to passing the basic swimming proficiency test.

**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.

**Diving** Fall.

Two classes a week, Helen Newman Hall.

Instruction in all the basic dives, including front (pike and layout), back, and front and back somersault.

**Advanced Lifesaving** Fall and spring.

Two classes a week, Helen Newman Hall and Teagle Hall.

American Red Cross senior lifesaving 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 advanced lifesaving certification.

Two 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.

**Water Safety Instructor Refresher Course** Spring.

Two classes a week, Teagle Hall.

Selected sessions of the basic water safety instructor certification course.

**Basic Scuba Diving** Fall and spring. Fee charged.

One two-hour class a week, Teagle Hall.

Beginning scuba—for general certification only. All equipment for pool sessions is provided: tanks, regulator, snorkel, and vest.

**Advanced Open-Water Scuba Diving** Fall and spring. Fee charged.

Hours to be arranged, Teagle Hall.

Program includes skill training in a pool and open-water training in Cayuga Lake. Internationally recognized basic certification.

**Beginning Synchronized Swimming** Fall.

Two-hour class one evening 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-hour class one evening a week, Helen Newman Hall.

Preparing, practicing for, and presenting an aquatic show.

**Swimming Conditioning** Fall and spring.

Prerequisite: good swimming ability.

Two classes a week, Teagle Hall.

Introduction to, and practice of, different training methods. Final objective: to swim 2,500 yards during class period.

**Inner-Tube Water Polo** Fall and spring

Two classes a week, Teagle Hall.

Ball handling, shooting, passing, basic offensive and defensive strategy. Scrimmaging while afloat on inner tubes.

**Archery****Basic Archery** Fall and spring.

Two classes a week, Teagle Hall.

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.

Two classes a week, Teagle Hall.

A review of basic archery skills; teaching progressions and correction of shooting errors are stressed, and aiming methods are introduced. The last four weeks are devoted to the New York State archery hunting certification, awarded on successful completion of the course.

**Dance****Ballroom Dancing** Fall and spring. Fee charged.

Students and their partners must sign up at course registration.

One evening class a week, Helen Newman Hall. Includes instruction in the waltz, Charleston, rumba, and tango.

**Square Dancing** Spring. Students and their

partners must sign up at course registration.

Two classes a week, Helen Newman Hall.

Introduction to square dancing.

**Aerobic Dance** Fall and spring. Fee charged.

Two classes a week, Helen Newman Hall.

A simple dance program designed to keep the cardiovascular system in top shape by making the body demand increased amounts of oxygen.

**Dance** Fall and spring.

Two or three classes a week, Helen Newman Hall.

Develops flexibility, coordination, and the ability to perceive and reproduce phrases of dance movement with rhythmic accuracy and clarity of body design. 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.

**Asian Dance****Elementary Ballet****Intermediate Ballet****Advanced Ballet****Jazz Dance I****Jazz Dance II****Elementary Modern Dance****Intermediate Modern Dance****High-Intermediate Modern Dance****Advanced Modern Dance****Fencing****Fencing I** Fall and spring. Fee charged.

Two classes a week, Teagle 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, Teagle Hall.

Interclass competition is stressed. Equipment is furnished.

**First Aid****Basic First Aid** Fall and spring. Textbook fee charged.

One or two classes a week, Teagle Hall.

American Red Cross standard first-aid course.

Certification is awarded on satisfactory completion of the course.

**Athletic Training and Injury** Fall and spring.

Textbook fee charged.

Two-hour class one evening a week, Teagle Hall.

Survey of anatomical, physiological, and psychological causes and results of athletic injuries.

**Cardiopulmonary Resuscitation (CPR)** Fall and spring. No credit. Fee charged.

One class a week for four weeks, Teagle Hall.

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, Teagle Hall.

Instruction by PGA professionals 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.

Nine holes twice a week, Moakley golf course.

Students must provide their own clubs.

**Gymnastics****Beginning Gymnastics** Fall and spring.

Two classes a week, Teagle Hall.

Basic instruction in tumbling, dance for gymnastics, trampoline, and use of all pieces of apparatus.

**Intermediate Gymnastics** Fall and spring.

Two classes a week, Teagle Hall.

Beginning gymnastics or the equivalent is a prerequisite.

**Jogging****Jogging** Fall and spring.

Two classes a week, Teagle Hall.

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.

Three classes a week for seven weeks, Helen Newman Hall.

Each class consists of a three-to-five-mile jogging tour of a local area.

**Karate Shito Ryu****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.

## Outdoor Skills

**Introduction to Backpacking** Fall and spring. One section limited to women; all others are coed. Fee charged.

Hours to be arranged, Teagle Hall.  
Class sessions lead to a full weekend on the trail in a local wilderness area.

**Basic Mountaineering (Rock Craft)** Fall and spring. Fee charged for equipment and travel.  
One class a week, Teagle Hall.  
Basic instruction and practice in rock climbing, rappelling, knot craft, and rescue techniques.

**Outdoor Leadership Training** Fall and spring. Fee charged.  
Hours to be arranged, Teagle Hall.  
A combination of class sessions and outings designed for the experienced outdoor person, whether backpacker, cyclist, or canoeist.

**Outdoor Survival** Fall and spring. Fee charged.  
Hours to be arranged, Teagle Hall.  
Lectures and short outings lead to a full weekend in a local wilderness area, practicing outdoor survival skills.

**Ice Climbing** Spring. Limited to experienced mountain climbers. Prerequisite: permission of instructor. Fee charged.  
Hours to be arranged, Teagle Hall.  
Climbing techniques for ice surfaces. Includes outings to local parks.

**Intermediate Mountaineering** Spring and fall. Prerequisite: Basic Mountaineering or the equivalent. Fee charged.  
Hours to be arranged, Teagle Hall.  
Saturday outings to local parks feature advanced rock-climb skills and rescue techniques.

**Bicycle Touring** Fall and spring. One spring section limited to women; all others are coed. Fee charged.  
Hours to be arranged, Teagle Hall.  
Covers bicycle repair, physical conditioning, trip planning, and road safety. Classes lead to a weekend bicycle camping trip. Students must provide their own bicycles.

**Flat-Water Canoeing** Fall and spring. Fee charged.  
Hours to be arranged, Teagle Hall.  
Classes and local practice sessions lead to a weekend canoeing trip.

**White-Water Canoeing** Spring. Fee charged for canoe rental, food, and transportation to mountains.  
Hours to be arranged, Teagle Hall.  
Classes and local practice sessions lead to a weekend canoeing trip on Adirondack waterways.

**Wilderness Travel** Spring. Fee charged.  
Hours to be arranged, Teagle Hall.  
An intensive skills course in outdoor living. Local outings and weekends lead to a week-long trip to the Allegheny Plateau during spring break.

**Winter Camping** Spring. Limited to experienced outdoor people. Coed. Fee charged.  
Hours to be arranged, Teagle Hall.  
One-day outings in the Ithaca area lead to a seven-day trip to the White Mountains of New Hampshire during spring break.

## Riflery

**Riflery** Fall and spring. Fee charged.  
Two classes a week, Helen Newman Hall.  
Instruction and practice in the techniques of target riflery from various shooting positions.

**Skeet and Trapshooting** 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.

**Hunter Safety** Fall and spring.  
Hours to be arranged, Teagle Hall.  
Instruction in hunter safety leads to New York State certification for bow and gun.

## Sailing

**Principles of Sailing** Fall and spring. Fee charged.  
One class a week, Teagle Hall.  
Instruction in basic sailing skills and safety principles. Students sail small and large boats on Cayuga Lake, weather permitting.

**Intermediate Sailing** Fall and spring. Fee charged.  
One class a week, Teagle Hall.  
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 and Low-Intermediate 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 and Advanced Figure Skating** Fall and spring. Limited to experienced skaters. Fee charged.  
Three classes a week for half a term, Lynah Rink.  
Advanced figure skating techniques. Students provide their own figure skates or rent them at Lynah Rink.

**High-Intermediate and 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.

## Skiling

**Skiling Conditioning** Fall.  
Two classes a week, Helen Newman Hall.  
Exercises designed to increase flexibility, strength, and endurance in preparation for the ski season.

**Downhill Skiling** Spring. Fee charged.  
One class a week, Teagle Hall.  
Transportation, instruction, ski-lift fees, and skiling time are offered in a package deal. Greek Peak 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.

**Cross-Country Skiling** Spring. Fee charged.  
Two-hour class one afternoon a week, Helen Newman Hall.  
Classes designed for all levels. Covers waxing and choosing equipment.

## T'ai Chi Chuan

**T'ai Chi Chuan I** Fall and spring.  
Three 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.

**T'ai Chi Chuan II** Fall and spring.  
Three classes a week, Teagle Hall.  
Designed for those who have completed T'ai Chi Chuan I or its equivalent.

## Tennis

**Indoor Tennis** Spring. Fee charged.  
Two classes a week, Teagle Hall.  
Classes for all levels of play. Emphasizes strategy for intermediate and advanced groups. Space limitation requires doubles play.

**Beginning Outdoor Tennis** Fall.  
Three classes a week for half a term, Helen Newman Hall.  
Instruction and practice in basic strokes (forehand, backhand, serve).

**Intermediate Outdoor Tennis** Fall.  
Three classes a week for half a term, Helen Newman Hall.  
Use of fundamental strokes, lobs, and drop shots; doubles strategy.

**Advanced Outdoor Tennis** Fall. Limited to experienced players.  
Three classes a week for half a term, Helen Newman Hall.  
Emphasizes strategy.

## Volleyball

**Intermediate Volleyball** Fall and spring.  
Two classes a week, Helen Newman Hall and Teagle Hall.  
Passing and blocking strategy; scrimmages in class.

**Advanced Volleyball** Fall and spring.  
Two classes a week, Helen Newman Hall.  
Offensive and defensive team strategy is emphasized in class scrimmages.

## Yoga

**Yoga I** Fall and spring. 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.  
Two classes a week, Teagle Hall.  
Designed for those who have completed Yoga I or the equivalent.

## Division of Summer Session, Extramural Courses, and Related Programs

### Administration

Robert D. MacDougall, dean  
Charles W. Jermy, Jr., associate dean  
Fred L. Conner, manager, media services  
Judith K. Eger, director, continuing education  
research and development  
Ed McKeown, assistant to the dean  
Valerie A. Sellers, registrar  
Marjorie S. VanNess, business manager

### The Division

The Division of Summer Session, Extramural Courses, and Related Programs 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.

### Summer Session

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. Students of all ages—high school seniors, senior citizens, and everyone in between—may choose from a wide spectrum of courses scheduled during three-, six-, and eight-week sessions, as well as from dozens of special programs of varied lengths. Admission is relatively open and simple. Classes meet daily and are usually kept small to foster a close association between students and teachers. For more information, students should consult the Summer Session Office, B12 Ives Hall, or call 256-4987.

### Cornell's Adult University

Cornell's Adult University (CAU) offers one-week, noncredit academic courses on campus during the summer and weekend seminars at off-campus locations during the fall and spring. Originally conceived as a program for alumni, CAU has greatly broadened its mission in the area of adult education. All courses and seminars 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 more information, interested persons should consult Cornell's Adult University, 626B Thurston Avenue, or call 256-6260.

### Extramural Courses

The extensive credit-course offerings of the University are available to area residents on a part-time basis. 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. The division also offers an Official Visitor's Program that 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 from the instructor. In this program no credit is given and no record is kept of attendance or performance. During the January intersession period the division offers credit courses primarily for undergraduates but open to anyone. Among the courses offered in recent years have been study tours to England, the Soviet Union, and Costa Rica. For further information, interested persons should contact the Extramural Office in B12 Ives Hall or call 256-4987.

### Continuing Education Information Center

The Continuing Education Information Center provides free information, counseling, and referral to men and women who have been out of school for several years and want to resume their education. Anyone who wants to take courses, begin an undergraduate or graduate degree program, or complete an unfinished degree is welcome to use the services of the center.

The center provides information on all schools and departments of the University; opportunities for part-time and full-time study; special courses, workshops, and seminars; and community resources available to older students. A small library includes information on continuing-education research, adult learning and development; educational opportunities at local institutions of higher learning, financial aid, work-study programs, and admission procedures. For further information, interested persons should contact the Continuing Education Information Center, B12 Ives Hall, or call 256-4987.

### Conference Services

Excellent facilities, a beautiful campus, and a conference office concerned with each group's special needs make Cornell an ideal setting for conferences and meetings. Professional groups from all over the country come to Cornell to take advantage of this special learning environment. The conference coordinator is available to answer questions, advise on creative program ideas, assist in planning, make special arrangements, secure accommodations, and handle other administrative details. Every effort is made to ensure the success of each conference.

For more information about conferences at Cornell, interested persons may consult Cornell University Conference Services, 221E Robert Purcell Union, or call 256-6290.

### Summer Courses

The Cornell University Summer Session always offers a wide variety of courses. Among these are a number of courses that are usually offered every summer. The list that follows includes those courses that are likely to be offered during the summer of 1984. The list is not exhaustive; many additional courses that are offered only occasionally or for the first time are not listed. For further information, students should contact the Summer Session Office, B12 Ives Hall, or call 256-4987. The 1984 *Announcement of Summer Session* will be published in March.

### Africana Studies and Research Center

131-132 Swahili

### Agricultural and Life Sciences (Interdepartmental)

5 Basic Review Mathematics

### Anthropology

111 Nature and Culture

113 The Comparison of Cultures

114 Human Origins

145 Cultures of Native America

### Archaeology

100 Introduction to Archaeology

358 Archaeological Research Methods

359 Field Archaeology in Mesoamerica

360 Archaeological Excavations in Cyprus

### Architecture

125 Introduction to Architecture

251 Beginning Photography

545 Perspectives in Conservation

Consult the Department of Architecture office for a complete list of summer design offerings.

### Art

110 Color, Form, and Space

121 Painting

123 Landscape Painting

131 Introductory Intaglio Printing

132 Introductory Silk-Screen Printing

141 Sculpture

151 First-Year Drawing

154 Life and Still-Life Drawing

155 Conceptual Drawing

261 Beginning Photography

263 Advanced Photography Workshop

361 Third-Year Photo: Color I

370 Special Studios

### Astronomy

105 An Introduction to the Universe

106 Essential Ideas in Relativity and Cosmology

### Atmospheric Sciences

101 Basic Principles of Meteorology

### Biological Sciences

100 General Biology

205 Biomedical Ethics

## 352 Summer Session, Extramural Courses, and Related Programs

- 240 Plant Physiology
- 278 Comparative Anatomy
- 331 Principles of Biochemistry, Lectures
- 360 General Ecology
- 389 Embryology
- 421 Comparative Vertebrate Ethology
- 432 Survey of Cell Biology
- 475 Ornithology

### Business and Public Administration

- 590 Management Communication

### Chemical Engineering

- 220 Mass and Energy Balances

### Chemistry

- 103-104 Introduction to Chemistry
- 207-208 General Chemistry
- 251-252 Introduction to Experimental Organic Chemistry
- 253 Elementary Organic Chemistry
- 300 Quantitative Chemistry
- 421 Introduction to Inorganic Research
- 433 Introduction to Analytical Research
- 461 Introduction to Organic Research
- 477 Introduction to Research in Physical Chemistry

### City and Regional Planning

Consult the office of the Department of City and Regional Planning for a complete list of offerings in progressive planning.

### Classics

#### Greek

- 101 Greek for Beginners
- 103 Attic Greek

#### Latin

- 105 Latin for Beginners
- 106 Elementary Latin

#### Classical Civilization

- 100 Word Power
- 109 Introduction to Rhetoric
- 150 The Myths of Greece and Rome

### Communication Arts

- 301 Oral Communication
- 312 Advertising and Promotion
- 360 Scientific Writing for Public Information
- 363 Organizational Writing

- 365 Writing in the Sciences and Engineering
- 413 Writing for Magazines
- 460 Video Communication
- 461 Advanced Video Communication

### Comparative Literature

- 113 Science Fiction
- 121 Literatures from the Third World

### Computer Science

- 100 Introduction to Computer Programming
- 101 The Computer Age
- 211 Computers and Programming
- 314 Introduction to Computer Systems and Organization
- 410 Data Structures

### Economics

- 101 Introductory Economics: Macroeconomics
- 102 Introductory Economics: Microeconomics
- 105 Principles of Accounting
- 205 Managerial Accounting for Planning and Control
- 311 Intermediate Microeconomic Theory
- 312 Intermediate Macroeconomic Theory
- 313 Intermediate Microeconomics
- 314 Intermediate Macroeconomics
- 315 History of Economic Thought
- 319-320 Quantitative Methods
- 331 Money and Credit
- 333 Theory and Practice of Financial Asset Markets
- 335 Public Finance: Resource Allocation and Fiscal Policy
- 351 Industrial Organization
- 352 Public Regulation of Business
- 361 International Trade: Theory and Policy
- 362 International Monetary Theory and Policy
- 368 Comparative Economics: United States, Europe, and the Soviet Union
- 371 Public Policy and Economic Development
- 381 Participation and Worker Management
- 383 Marxist Political Economy

### Education

- 420 Field Experience
- 497 Informal Study
- 620 Internship in Education
- 744 Faculty Development: Improvement of College Teaching

- 800 Master's-Level Thesis
- 900 Doctoral-Level Thesis

### Electrical Engineering

- 210 Introduction to Electrical Systems
- 676 Microprocessor Systems

### English

- 133 Basic Forms of Writing
- 135 Writing from Experience
- 136 Practical Prose Composition
- 137 Writing Workshop
- 150 Introduction to Fiction
- 151 Reading Modern Literature
- 157 Classic American Authors
- 158 Modern American Authors
- 227 Shakespeare
- 270 The Reading of Fiction
- 271 The Reading of Poetry
- 280 Creative Writing
- 288 Expository Writing
- 289 The Art of the Essay
- 319 Chaucer
- 327 Shakespeare
- 380 Creative Writing Workshop
- 470 James Joyce: *Ulysses*
- 477 Children's Literature

### Floriculture

- 210 Architectural Sketching in Watercolor

### Geological Sciences

- 101 Introductory Geological Science
- 102 Introduction to Historical Geology
- 401 Summer Field Geology

### German Literature

- 108 The Image of America in European Literature

### Government

- 100 Politics and Moral Choice
- 111 The Government of the United States
- 131 Introduction to Comparative Government and Politics
- 161 Freedom and Justice in the Western Tradition: An Introduction to Political Theory
- 181 Introduction to International Relations
- 300 Politics of Terrorism
- 316 The American Presidency

- 350 Comparative Revolution
- 358 Politics of the Middle East
- 389 International Law
- 406 The Politics of Education

## History

- 141 Man and His Values in the Western Tradition
- 151 Introduction to Western Civilization to 1600
- 152 Introduction to Western Civilization

## History of Art

- 202 Survey of European Art: Renaissance to Modern
- 261 Introduction to Art History: Modern Art

## Hotel Administration

- 161 Typewriting

## Human Development and Family Studies

- 115 Human Development: Infancy and Childhood
- 116 Human Development: Adolescence and Youth
- 150 The Family in Modern Society

## Human Service Studies

- 315 Human Sexuality: A Biosocial Perspective

## Human Ecology (Interdepartmental)

- 200 Preparation for Field Study: Perspectives in Human Ecology

## Industrial and Labor Relations

### Collective Bargaining

- 100 History of Industrial Relations in the United States

- 200 Collective Bargaining

- 201/501 Labor Relations Law and Legislation

- 405 Dramatic Events in Labor History as Told by Those Who Made It

- 686 Collective Bargaining in the Public Sector

- 687 Current Issues in Collective Bargaining

### Economic and Social Statistics

- 510 Introductory Statistics for the Social Sciences

### Labor Economics

- 150 Labor Problems in American Society
- 240 Economics of Wages and Employment

### Organizational Behavior

- 222 Studies in Organizational Behavior: Regulating the Corporation
- 322 Comparative Theories of Organizational Behavior

- 326 Sociology of Occupations

- 370 The Study of Work Motivation

- 371 Individual Differences and Organizational Behavior

- 373 Organizational Behavior Simulations

- 520 Organizational Behavior I

### Personnel and Human Resource Management

- 260/560 Personnel Management

- 361 Effective Supervision

## Law

- 497 Family Law

- 498 Constitutional Law

- 499 Criminal Law

## Marine Science

Consult the Shoals Marine Laboratory office for a complete list of summer offerings in marine science.

## Mathematics

- 107 Finite Mathematics with Applications

- 109 Precalculus

- 111–112 Analytic Geometry and Calculus

- 121–122 Calculus

- 123 Analytic Geometry and Calculus

- 192 Calculus

- 213 Calculus

- 231 Linear Algebra

- 294 Engineering Mathematics

- 372 Elementary Statistics

- 421–422 Applicable Mathematics

- 451 Classical Geometrics

## Mechanical and Aerospace Engineering

- 302 Technology, Society, and the Human Condition

## Microbiology

- 290 General Microbiology, Lectures

- 291 General Microbiology, Laboratory

## Modern Languages and Linguistics

### Chinese

- 160 Introductory Intensive Chinese (Mandarin)

- 201–202 Intermediate Chinese

### English

- 101–102 English as a Second Language

### French

- 101 French Basic Course I

- 102 French Basic Course II

- 123 Continuing French

- 203 Intermediate Conversation and Composition Gaelic

- 131 Introduction to Modern Gaelic

### German

- 101 German Basic Course I

- 123 Continuing German

- 131–132 German Elementary Reading Course I

### Japanese

- 160 Introductory Intensive Japanese

- 403 Teaching of Japanese as a Foreign Language

### Linguistics

- 101 Introduction to the Scientific Study of Language

### Spanish

- 101 Spanish Basic Course I

- 102 Spanish Basic Course II

- 203 Intermediate Conversation and Composition

## Music

- 101 The Art of Music

- 105 Introduction to Music Theory

- 221 Popular Music

- 331 Summer Session Choir

## Natural Resources

- 201 Environmental Conservation

- 230 Diet for a Small Planet

- 450 Natural Resources and the World Food Situation

## Near Eastern Studies

- 103 Elementary Modern Hebrew: Second Semester

- 241 The Holocaust: European Jewry, 1933–45

- 261 Ancient Seafaring

- 294 Modern History of the Middle East: Changing Politics, Society, and Ideas

- 364 Introduction to Field Archaeology in Israel

## Operations Research and Industrial Engineering

- 260 Introductory Engineering Probability

- 270 Basic Engineering Probability and Statistics

- 622 Operations Research I

## Philosophy

- 100 Philosophical Thinking

- 101 Introduction to Philosophy

## 354 Summer Session, Extramural Courses, and Related Programs

103 Reasoning and Writing

131 Logic: Evidence and Argument

145 Contemporary Moral Issues

245 Biomedical Ethics

### Physical Education

Consult the Physical Education Office for a complete list of summer offerings for credit and recreation.

### Physics

101-102 General Physics

112 Physics I: Mechanics and Heat

213 Physics II: Electricity and Magnetism

214 Physics III: Optics, Waves, and Particles

400 Independent Study in Physics: Advanced Experimental Physics

500 Informal Graduate Laboratory

510 Advanced Experimental Physics

### Psychology

101 Introduction to Psychology: The Frontiers of Psychological Inquiry

124 Control of Human Behavior: A Neuropsychological Perspective

128 Introduction to Psychology: Personality and Social Behavior

209 Developmental Psychology

214 Introduction to Psychology: The Cognitive Approach

281 Interpersonal Relations and Small Group Processes

282 Psychology of Stereotyping and Prejudice

286 Nonverbal Behavior and Communication

321 Psychological Development through the Life Span

325 Introductory Psychopathology

350 Statistics and Research Design

402 Current Research on Psychopathology

440 The Psychology of Dreams and Dreaming

469 Psychotherapy Workshop: Its Nature and Influence

### Romance Studies

French

201 Introduction to French Literature

Spanish

201 Introduction to Hispanic Literature

### Rural Sociology

360 The Old Order Amish: Folk Society or Model for the Future?

437 Environment and Aging

### Sociology

101 Introduction to Sociology

243 Family

252 Public Opinion

281 Interpersonal Relations and Small Group Processes

282 Psychology of Stereotyping and Prejudice

286 Nonverbal Behavior and Communications

347 Environment and Aging

### Theatre Arts

125 Writing for the Theatre

200 Introduction to Dance

240 Introduction to the Theatre

287 Summer Acting Workshop

374 Introduction to Film Analysis: Meaning and Value

474 Intensive 16-mm Film Production

### Theoretical and Applied Mechanics

202 Mechanics of Solids

### Veterinary Medicine

638 The Microscope and Its Use



# New York State College of Veterinary Medicine

## Administration

Edward C. Melby, Jr., dean

Charles G. Rickard, associate dean for academic programs

Lennart P. Krook, associate dean for postdoctoral education

Robert B. Brown, assistant dean for administration

Richard Rostowsky, assistant dean for hospital administration

John C. Semmler, assistant dean for facilities and research administration

Roy V. Pollock, assistant dean for curriculum development

Ann Marcham, assistant to the dean for instructional support and special projects

Ralph A. Jones, assistant to the dean for public affairs

Neil L. Norcross, secretary of the college

Fred W. Quimby, director of laboratory animal medicine and service

Marcia James Sawyer, director of student affairs and admissions

John L. Lewkowicz, director of computer resources

Alexander deLahunta, medical director of the Teaching Hospital

Charles E. Short, director of continuing education

Raymond H. Cypess, director of the Diagnostic Laboratory

## 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. In exceptional cases, outstanding students who have completed all of the prerequisites in two years of undergraduate education may be considered for admission. 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, Doctor of Science in Veterinary Medicine, or Doctor of Philosophy.

More detailed information is contained in the *Announcement of the New York State College of Veterinary Medicine*, which may be obtained by writing to the college.

## Anatomy

**500–501 Gross Anatomy** 500, fall; 501, spring.

**502 Developmental Anatomy and Cytology** Fall.

**503 Histology and Organology** Spring.

**504 Neuroanatomy** Spring.

**505–506 Applied Anatomy** 505, fall; 506, spring.

**600 Special Projects in Anatomy** Fall and spring.

**601 Advanced Anatomy** Fall and spring.

**602 Advanced Clinical Neurology** Fall.

## Avian and Aquatic Animal Medicine

**255 Poultry Hygiene and Disease** Fall.

**555 Avian Diseases** Spring.

**672 Aquavet: Introduction to Aquatic Veterinary Medicine** Mid-May–mid-June.

**770 Advanced Work in Avian Diseases** Fall and spring.

**771 Graduate Seminar in Diseases of Aquatic Animals** Fall and spring.

**772 Advanced Work in Aquatic Animal Diseases** Fall and spring.

## Clinical Sciences

**475 Health and Diseases of Animals** Spring.

**540 Pathology Service** Fall and spring.

**546 Clinical Orientation** Fall.

**547 Practice Management Experience at the Small Animal Hospital** Fall and spring.

**560 Clinical Methods** Fall.

**561–562 Obstetrics and Reproductive Diseases** 561, spring; 562, fall

**563–564 Large Animal Medicine** 563, fall; 564, spring.

**565 Large Animal Surgery** Spring.

**566 Radiology** Spring.

**567 Clinical Nutrition** Fall.

**568–569 Veterinary Medical Orientation** 568, fall; 569, spring.

**570 Theriogenology** Spring.

**572 Senior Seminar** Fall and spring

**574 Large Animal Surgery Service** Fall and spring.

**575 Ambulatory Medical Service** Fall.

**578 Anesthesiology Service** Fall and spring.

**579 General Medicine** Spring.

**580 Radiology Service** Fall and spring

**581 Nutrition** Fall.

**582 Large Animal Surgical Techniques** Spring.

**583–584 Small Animal Medicine and Surgery** 583, fall; 584, spring.

**586 Small Animal Surgical Exercises** Spring

**587 General Surgery and Anesthesiology** Fall

**589 Small Animal Medicine Service** Fall and spring.

**591 Small Animal Surgery Service** Fall and spring.

**593 Ophthalmology Service** Fall and spring.

**594 Large Animal Medicine Service** Fall and spring.

**596 Opportunities in Veterinary Medicine** Fall and spring.

**598 Dermatology Service** Fall and spring.

**676 Special Problems in Large Animal Surgery** Fall or spring.

**677 Special Problems in Large Animal Obstetrics** Spring.

**680 Poisonous Plants** Fall.

**681 Horse Health Management** Spring

**684 Horse Lameness** Spring.

**686 Goats: Management and Diseases** Spring

**687 Diseases of Swine** Spring.

**688 Special Problems in Small Animal Medicine** Spring.

**689 Special Problems in Small Animal Surgery** Spring.

**690 Veterinary Dermatology** Spring.

**691 Advanced Large Animal Internal Medicine Problems** Spring.

**778 Gastroenterology Conference** Spring

**781 Advanced Work** Fall and spring.

**782 Ophthalmology** Fall.

## Microbiology

**315 Basic Immunology, Lectures ((also Biological Sciences 305)** Fall.

**316 Basic Immunology, Laboratory (also Biological Sciences 307)** Fall.

**317 Pathogenic Microbiology** Spring.

**515 Veterinary Immunology** Fall.

**516 Veterinary Bacteriology and Mycology** Fall.

**517 Veterinary Virology** Spring.

**518 Infectious and Zoonotic Diseases** Spring

**605 Special Projects in Microbiology** Fall and spring.

**606 Small Animal Infectious Diseases** Spring.

**706 Immunology Seminar Series** Fall and spring.

**707 Advanced Work in Bacteriology, Virology, or Immunology** Fall and spring.

**708 Animal Virology, Lectures and Laboratory Demonstrations** Spring.

**709 Laboratory Methods of Diagnosis** Fall and spring.

**710 Microbiology Seminar** Fall and spring.

**711 Seminars on Current Topics in Immunology and Microbiology** Fall, spring, and summer.

**713 (Special Topics in Immunology) The Major Histocompatibility Complex and Its Role in the Regulation of the Immune Responses** Spring.

**714 (Special Topics in Immunology) Immune Responses to Viruses and Tumors** Spring.

**715 (Special Topics in Immunology) Mucosal Immunity** Spring.

## Pathology

**535 Veterinary Pathology I** Fall.

**536 Veterinary Pathology II** Spring.

**539 Introduction to Laboratory Animal Medicine** Fall.

**540 Pathology Service** Fall and spring

**571 Clinical Pathology** Fall.

**635 Special Problems in Pathology** Fall and spring.

**636 Wildlife Pathology** Fall.

**637 Postmortem Pathology** Fall.

**639 Autotutorial Laboratory Animal Medicine and Science** Fall.

**641 Clinical Immunology** Spring.

**736 Pathology of Nutritional Diseases** Spring.

**739 Advanced Work in Pathology** Fall and spring.

**749 Laboratory Animal Clinical Rotation** Fall and spring.

**788 Seminar in Surgical Pathology** Fall and spring.

**789 Seminar in Necropsy Pathology** Fall and spring.

**790 Special Topics in Pathology** Fall.

**792 Immunopathology** Spring.

**793 Lectures in General Pathology** Fall.

**794 Lectures in Special Pathology** Spring

## Pharmacology

**528 Pharmacology (also Toxicology 528)** Spring.

**529 Clinical Pharmacology** Fall.

**621 Toxicology (also Toxicology 621)** Spring.

**622 Special Projects in Pharmacology** Fall and spring.

**623 Ecology of Environmental Toxins** Fall.

**721 Research** Fall and spring.

**724 Disposition of Drugs and Poisons** Spring.

## Physiology

**Biological Basis of Sex Differences (Biological Sciences 214)** Spring

**Animal Reproduction and Development (Animal Sciences 220)** Fall.

**The Vertebrates (Biological Sciences 274)** Spring

**Histology: The Biology of the Tissues (Biological Sciences 313)** Fall.

**Ecological Animal Physiology, Lectures (Biological Sciences 315)** Fall

**Cellular Physiology (Biological Sciences 316)** Spring.

**Ecological Animal Physiology, Laboratory (Biological Sciences 317)** Fall

**346 Introductory Animal Physiology, Lectures (also Biological Sciences 311)** Fall.

**348 Introductory Animal Physiology, Laboratory (also Biological Sciences 319)** Fall.

**Seminar in Anatomy and Physiology (Biological Sciences 410)** Fall and spring.

**Special Histology: The Biology of the Organs (Biological Sciences 412)** Spring.

**General Animal Physiology: A Quantitative Approach, Lectures (Biological Sciences 416)** Spring.

**General Animal Physiology, Laboratory (Biological Sciences 418)** Spring.

**Fundamentals of Endocrinology (Animal Sciences 427)** Fall.

**Mammalian Physiology (Biological Sciences 458)** Spring.

**Undergraduate Research in Biology (Biological Sciences 499)** Fall and spring

**525 Veterinary Physiology I** Fall.

**526 Veterinary Physiology II** Spring.

**527 Veterinary Physiology III** Fall.

**Lipids (Biological Sciences 619 and Nutritional Sciences 602)** Fall.

**626 Veterinary Animal Behavior** Spring

**627 Acid-Base Relations** Fall and spring.

**628 Graduate Research in Animal Physiology (also Biological Sciences 719)** Fall and spring

**650 Special Projects in Physiology** Fall

**652 Applied Electrophysiology (also Biological Sciences 617)** Fall.

**History of Physiology (Biological Sciences 712)** Spring.

**Farm Animal Behavior (Biological Sciences 713)** Fall.

**Plasma Lipoproteins (Biological Sciences 714)** Spring.

**Evolution of Color Vision (Biological Sciences 715)** Fall.

**Dependability of the Nervous Systems (Biological Sciences 716)** Spring

**Fish as a Subject of Physiologic Inquiry (Biological Sciences 717)** Fall.

**Nutritional Pathophysiology (Biological Sciences 718)** Spring.

**720 Special Problems in Physiology** Fall and spring.

**726 Physiology** Spring.

**727 Physiology** Fall.

**750 Radioisotopes in Biological Research (also Biological Sciences 616)** Fall.

**752 Biological Membranes and Nutrient Transfer (also Biological Sciences 618)** Spring.

**753 Mammalian Neurophysiology (also Biological Sciences 450)** Spring

**755 Physiology Graduate Seminar** Fall.

**758 Molecular Mechanisms of Hormone Action (also Biological Sciences 658)** Spring.

## Preventive Medicine

**330 The Population Biology of Health and Disease** Spring.

**331 Medical Parasitology** Fall.

**332 Systematics and Bionomics of Animal Parasites** Fall.

**510 Animal Parasitology** Fall.

**511 Diagnostic Parasitology** Fall

**512 Veterinary Medical Orientation** Fall.

**520 Preventive Medicine in Animal Health Management** Spring.

**545 Veterinary Epidemiology** Fall.

**660 Safety Evaluation in Public Health (also Toxicology 660)** Spring.

**661 Data Processing in Preventive Medicine** Spring.

**664 Introduction to Epidemiology** Fall.

**665 Advanced Epidemiology** Fall.

**737 Advanced Work in Animal Parasitology** Fall and spring.

**766 Graduate Research** Spring

**767 Immunoparasitology** Spring

**768 Master's-Level Thesis Research** Fall and spring.

**769 Doctoral-Level Thesis Research** Fall and spring.

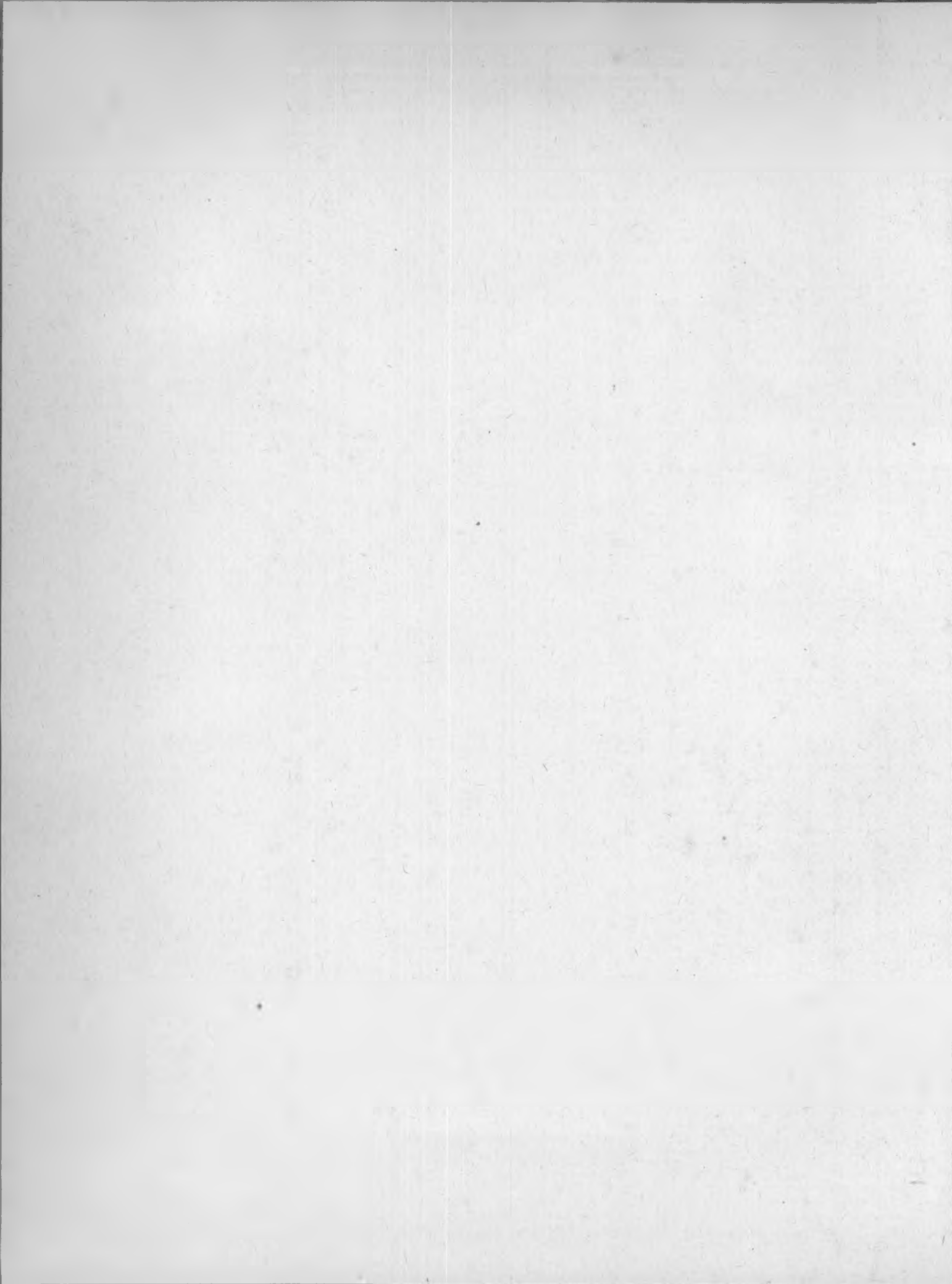
**786 Graduate Seminar** Fall and spring.

**787 The Biology of Parasitism** Spring.

**799 Independent Study** Spring.

## Faculty Roster

- Antczak, Douglas F., Ph.D., U. of Cambridge (England). Asst. Prof., Microbiology
- Appel, Max J., Ph.D., Cornell U. Prof., Microbiology
- Babish, John, Ph.D., Cornell U. Asst. Prof., Preventive Medicine
- Bell, Robin G., Ph.D., Australian National U. Asst. Prof., Microbiology
- Bergman, Emmett N., Ph.D., U. of Minnesota. Prof., Physiology
- Blue, Julia T., Ph.D., U. of Pennsylvania. Asst. Prof., Clinical Sciences
- Blue, Murray G., Ph.D., Massey U. Asst. Prof., Clinical Sciences
- Brunner, Michael A., Ph.D., Cornell U. Asst. Prof., Preventive Medicine
- Calnek, Bruce W., D.V.M., Cornell U. Prof., Avian and Aquatic Animal Medicine
- Campbell, S. Gordon, Ph.D., Cornell U. Prof., Microbiology
- Carmichael, Leland E., Ph.D., Cornell U. John M. Olin Professor of Virology, Microbiology
- Casarett, Alison P., Ph.D., U. of Rochester. Prof., Physiology
- Castleman, William L., Ph.D., U. of California at Davis. Asst. Prof., Pathology
- Center, Sharon A., D.V.M., U. of California at Davis. Asst. Prof., Clinical Sciences
- Clark, Larry C., Ph.D., U. of North Carolina. Asst. Prof., Preventive Medicine
- Cockerell, Gary L., Ph.D., Ohio State U. Assoc. Prof., Pathology
- Collier, Michael A., D.V.M., Washington State U. Asst. Prof., Clinical Sciences
- Cooper, Barry J., Ph.D., U. of Sydney (Australia). Asst. Prof., Pathology
- Corradino, Robert A., Ph.D., Cornell U. Assoc. Prof., Physiology/(Section of Physiology)
- Cummings, John F., Ph.D., Cornell U. Prof., Anatomy
- Cypess, Raymond H., Ph.D., U. of North Carolina. Prof., Diagnostic Laboratory/Preventive Medicine/Microbiology
- deLahunta, Alexander, Ph.D., Cornell U. Prof., Clinical Sciences/Anatomy
- Dobson, Alan, Ph.D., U. of Aberdeen (Scotland). Prof., Physiology/(Section of Physiology)
- Dubovi, Edward J., Ph.D., U. of Pittsburgh. Asst. Prof., Diagnostic Laboratory
- Dunny, Gary M., Ph.D., U. of Michigan. Asst. Prof., Microbiology
- Erb, Hollis N., Ph.D., U. of Guelph (Canada). Asst. Prof., Preventive Medicine
- Evans, Howard E., Ph.D., Cornell U. Prof., Anatomy
- Fabricant, Julius, Ph.D., Cornell U. Prof., Avian and Aquatic Animal Medicine/Microbiology
- Fewtrell, Clare, D.Phil., U. of Oxford (England). Asst. Prof., Pharmacology
- Fox, Francis H., D.V.M., Cornell U. Prof., Clinical Sciences
- Fregin, G. Frederick, V.M.D., U. of Pennsylvania. Assoc. Prof., Diagnostic Laboratory
- French, Tracy W., D.V.M., Purdue U. Asst. Prof., Pathology
- Gasteiger, Edgar L., Jr., Ph.D., U. of Minnesota. Prof., Physiology/(Section of Physiology)
- Georgi, Jay R., Ph.D., Cornell U. Prof., Pathology/Preventive Medicine
- Gillespie, James H., V.M.D., U. of Pennsylvania. Prof., Microbiology
- Gilmore, Dougald R., B.V.Sc., U. of Queensland (Australia). Asst. Prof., Clinical Sciences
- Gleed, Robin D., D.V.A., U. of Liverpool (England). Asst. Prof., Clinical Sciences
- Graham, David L., Ph.D., Iowa State U. Prof., Avian and Aquatic Animal Medicine
- Guard, Charles L. III, Ph.D. Case Western Reserve U. Asst. Prof., Clinical Sciences
- Hackett, Richard P., Jr., D.V.M., Ohio State U. Asst. Prof., Clinical Sciences
- Hall, Charles E., D.V.M., Cornell U. Assoc. Prof., Clinical Sciences
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