Cornell University
Announcements

Courses of Study

Cornell University

Courses of Study

1984–85

Cornell University Announcements
(USPS 132–860)

Volume 76 of the Cornell University Announcements consists of seven catalogs, of which this is number 4, dated July 16, 1984. Issued twice in March, once in June, once in July, once in August, and once in October. Published by the Office of University Publications, Cornell University, East Hill Plaza, Ithaca, New York 14850. Second-class postage paid at Ithaca, New York.

Postmaster: Send address changes to the Office of Admissions, Cornell University, 410 Thurston Avenue, Ithaca, New York 14850.

Cornell University Calendar 1984–85

Fall Semester

Saturday, August 25	New-student orientation begins
	Residence halls open
Tuesday and Wednesday, August 28 and 29	Registration
Thursday, August 30	Instruction begins, 7:30 a.m.
	Add/drop/change period begins
Monday, September 10	Physical education classes begin
Friday, September 21	Last day of add/drop/change period
	Last day for late registration
Friday–Sunday, September 21–23	New-Student Parents' Weekend
Saturday, October 13	Fall recess: instruction suspended, 1:10 p.m.
Wednesday, October 17	Instruction resumes, 7:30 a.m.
Saturday, October 27	Homecoming Weekend
Monday–Friday, October 29–November 9	Pre–course enrollment for spring 1985
Wednesday, November 21	Thanksgiving recess: instruction suspended, 1:10 p.m.
Monday, November 26	Instruction resumes, 7:30 a.m.
Saturday, December 8	Instruction ends, 1:10 p.m.
Monday–Wednesday, December 10–12	Study period
Thursday, December 13	Final examinations begin
Saturday, December 22	Final examinations end
	Residence halls close

Winter Session

Variable periods between Thursday, December 27, and Wednesday, January 23

Spring Semester

Monday, January 21	Residence halls open for continuing students
Tuesday, January 22	Residence halls open for new students
Thursday and Friday, January 24 and 25	Registration
Monday, January 28	Instruction begins, 7:30 a.m.
	Add/drop/change period begins
Monday, February 4	Physical education classes begin
Friday, February 15	Last day of add/drop/change period
Saturday, March 30	Spring recess: instruction suspended, 1:10 p.m.
Monday, April 8	Instruction resumes, 7:30 a.m.
Monday–Friday, April 8–19	Pre–course enrollment for fall 1985
Saturday, May 11	Instruction ends, 1:10 p.m.
Sunday–Wednesday, May 12–15	Study period
Thursday, May 16	Final examinations begin
Saturday, May 25	Final examinations end
	Residence halls close (students who are graduating may stay through Commencement Day)
Sunday–Saturday, May 26–June 1	Senior week
Sunday, June 2	Commencement Day

Summer Session 1985

Three-Week Session	Wednesday, June 5–Friday, June 28
Eight-Week Session	Monday, June 17–Tuesday, August 13
Six-Week Session	Monday, July 1–Tuesday, August 13

The dates shown in this calendar are subject to change at any time by offical 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.

Contents

University Administration

Frank H. T. Rhodes, president of the University
Robert Barker, University provost
Thomas H. Meikle, Jr., provost for medical affairs
William G. Herbster, senior vice president
David L. Call, vice president
William D. Gurowitz, vice president for campus affairs
Robert M. Matyas, vice president for facilities and business operations
Richard M. Ramin, vice president for public affairs
James A. Sanderson, chief investment officer
Joan R. Egner, associate provost
Kenneth M. King, vice provost
James W. Spencer, vice provost
Walter J. Relihan, Jr., University counsel and secretary of the corporation
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 begnning 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 seventeen 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, now called the Graduate School of Management. 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 or English History Emeritus

The Students

Cornell University has a student body of about 17,000 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	1,806
New York State	8,376
Mid-Atlantic	2,742
Southeast	563
Midwest	1,196
Southwest/Mountain	360
Far west	842
Foreign and United States possessions	1,437
Total	17,322*

*Figures are for fall 1983 and do not include extramural students, students registered in absentia, or students in the New York City divisions.

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, 234 Day Hall, Ithaca, New York 14853. Other questions or requests for special assistance may also be directed to that office.

Retention and Graduation of Undergraduates

By fall 1983, approximately 84 percent of the students that entered endowed undergraduate units in fall 1977 (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) approximately 91 percent had graduated or were still working toward a Cornell degree.

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

Cornell University Libraries is one of the major academic library systems in the United States. Its sixteen campus libraries contain almost five million volumes and subscribe to fifty-two thousand periodicals. The 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 at the beginning of each semester by the larger campus libraries. 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 133,000 volumes, are open to all, and only reserve books in heavy demand are held in a special category. There are listening rooms where students can 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, collections on East and Southeast Asia, the Icelandic Collection, the History of Science Collections, the archives of the University, maps, microfilms, 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 and include the research library of the Division of Biological Sciences.

Other college libraries are 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 that serve the Graduate School of Management, 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. Available in all the libraries are directories of subject locations, hours, and services.

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 particulaly 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 and graduate actors 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.

Other theatrical opportunities can be found in the undergraduate Drama Club; 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 program, cosponsored by the Departments of Theatre Arts and Physical Education and Athletics, offers a range of possibilities for students interested in dance. Work by faculty, student, and guest choreographers is presented during the year by means of informal studio presentations as well as fully produced performances. The dance program also sponsors a series of performances by professional touring companies. 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.

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 campuswide 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.

Cornell University is the New York Center for Biotechnology in agriculture and operates the Biotechnology Institute, which supports basic research in the cell sciences and molecular genetics.

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 Departments of Plant Breeding, Plant Pathology, Floriculture and Ornamental Horticulture, and Vegetable Crops; and the Section of Plant Biology, housed in the Plant Science Building, Guterman Laboratories, and Bradfield Hall, together with the Boyce Thompson Institute for Plant Research, which is housed in facilities on Tower Road, give the University the largest concentration of plant scientists in the world.

Near the campus are a 180-acre, University-affiliated 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 Laboratory of Nuclear Studies 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.

Resources for geological and seismological research are provided by the Consortium for Continental Reflection Profiling, centered in the Department of Geological Sciences.

The Program of Computer Graphics 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 members 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 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 clusters are located in ten different areas on campus, and they house approximately three hundred workstations, including almost one hundred microcomputers. A major expansion in the number of public microcomputers is planned. Freshman writing courses use IBM Displaywriters in a word processing center in Goldwin Smith Hall, and a computer graphics area for public use is located in Uris Hall. A laser printer has also been installed in Uris Hall for public use.

Cornell is attached to Telenet and TYMNET, which allow the central Cornell computers to be accessed by a local phone call from all fifty 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 or the Bachelor of Science (B.S.) degree, offered by the College of Agriculture and Life Sciences, the College of Human Ecology, the School of Hotel Administration, the College of Engieering, 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 Management, 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 their college registrar, 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 Management as well as in graduate fields following each of the undergraduate options.)

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

Applied economics and business management. 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, 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 Management, special opportunities exist for highly qualified undergraduates to combine their undergraduate programs with graduate study in that school. Students in the double-registrant program generally receive a bachelor's degree after four years of study and a Master of Business Administration 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 inormation 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 at Cornell are enrolled in the College of Agriculture and Life Sciences, which offers several applied science majors, including animal sciences, that can lead to related careers if the student is not accepted into veterinary college. Some enter other divisions of the University, especially the College of Arts and Sciences, because of secondary interests or the desire for a broad liberal arts curriculum.

The college-level prerequisite courses for admission to the 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 pp. 207–209.

Faculty Roster

Cross, William E., Ph.D., Princeton U. Assoc. Prof., Africana Studies and Research Center
Edmondson, Locksley G., Ph.D., Queens U. (Canada). Visiting 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

Davydd J. Greenwood, director

The Center for International Studies, 170 Uris Hall, is a University unit dedicated to the support and development of Cornell's international and comparative programs. Serving as an administrative base and clearinghouse for programs, information, and new initiatives in international studies, the center is particularly committed to the development of multidisciplinary, intercollege educational and research activities.

One major function of the center is the unversity-wide coordination of international experiences for undergraduate students Programs being developed include study abroad opportunities and summer internships. Cornell-sponsored study abroad programs should be in operation in 1985–86. In addition, summer international internships for preprofessional students are being developed and will begin on a limited basis in summer 1985. Currently a small number of students study abroad through exchanges arranged by the College of Human Ecology and the College of Agriculture and Life Sciences. A larger number of students study overseas by enrolling directly in a foreign university or in a program sponsored by an American university.

The center also sponsors the Field of International Development, a program leading to a professional master's degree.

Undergraduates interested in an international relations concentration should see Professor R. Rosecrance, in the Center for International Studies.

The current programs coordinated by the Center for International Studies include:

International Education/Study Abroad
(170 Uris Hall)

Mary F. Katzenstein, associate director; Ann Roscoe, executive staff assistant

Area Programs

China-Japan Program (140 Uris Hall)
Latin American Studies Program (190 Uris Hall)
South Asia Program (170 Uris Hall)
Southeast Asia Program (120 Uris Hall)
Soviet and East European Studies Program (170 Uris Hall)
Western Societies Program (130 Uris Hall)

Topical Programs

Comparative Studies in Professionalism and Professional Education (170 Uris Hall)
International Agriculture Program (261 Roberts Hall)
International Legal Studies (309 Myron Taylor Hall)
International Nutrition Program (114A Savage Hall)
International Political Economy (180 Uris Hall)
International Population Program (372 Uris Hall)
Peace Studies Program (180 Uris Hall)
Rural Development Committee (170 Uris Hall)
International Studies in 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 intedisciplinary 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 in 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 Management NPA 515, 2 semesters)
Social Implications of Technology (Civil and Environmental Engineering 325)
Environmental Law I and II (Civil and Environmental Engineering 625 and 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 Analysis 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 400–416)
Issues in Biology and Society: Chemicals, Enzymes, and Maladies (Biology and Society 304)
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)
Health Dialogues: Personal and Political (Biology and Society 102)
Writing as a Naturalist (Biology and Society 103)
Social History of Western Technology (History 380)
Comparative Public Law (Government 457)
Foundations of Social Policy (Management NHA 507)
Politics of Technical Decisions (Sociology 515, Management NPA 515, and Government 628)
Principles and Practices of Public Health I and II (Human Service Studies 580 and 581)
Introductory Health Services: Organization and Financing (Management NHP 500)
Impact and Control of Technological Change (Economics 302, Government 302, and City and Regional Planning 440)
Regulation of Toxic Substances (Civil and Environmental Engineering 627)

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 members in many University departments.

Graduate Studies

The major in the graduate Field of Environmental Toxicology promotes training leading to the M.S. or Ph D. degrees and provides both breadth and depth in environmental toxicology and related disciplines. The program offers a combination of research and didactic training that is designed to prepare students for solving the problems of modern toxicology. Specialization tracks include 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 607 Ecotoxicology (Natural Resources 607)
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 700 Ecotoxicological Methods (Natural Resources 700)
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)

Common Learning Courses

See p. 26.

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 the list at the end of this section). Placement and credit on the basis of these examinations will usually be determined during the summer, and students will be notified before course scheduling.

Departmental advanced standing examinations. In certain subjects, students may also qualify for advanced placement or credit or both on the basis of departmental examinations given on campus during orientation week. A schedule of these examinations will appear in the orientation booklet that will be mailed to entering students in late summer. The departments that award advanced placement and credit on the basis of CEEB Advanced Placement Examinations, 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 the list at the end of this section). The award of credit or placement for such courses is determined by the appropriate departments according to individual school and college guidelines. Because policy for using advanced placement credit varies according to each college's or school's professional and academic goals, students should consult their college or school office to determine how they may use such credit.

Foreign credentials. Information regarding Cornell's advanced standing policy for foreign credentials may be obtained by contacting the Associate Director of International Admissions, Cornell University, 410 Thurston Avenue, Ithaca, New York 14850, 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, students should consult the chairman of the Department of Classics.

Economics

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

English

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 should take the examination again during orientation week if they plan to continue course work.

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

1) For 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 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, 218 Lincoln Hall (telephone: 607/256-4243). Inquiries may be directed to the Department of Music, Cornell University, 124 Lincoln Hall (telephone: 607/256-4097).

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	Department determines credit and placement based on CEEB Achievement Examination.		
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 of Modern Languages and Linguistics 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 of Romance Studies 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	4,5	3 credits	
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.

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.

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

Physics C.

1) *C—Mechanics* Students earning a score of 4 or 5 may receive four credits for Physics 112 or 207.
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 scored 4 or 5 on the CEEB College-Level Examination Progam psychology test may receive 3 advanced placement credits in psychology. Those interested in taking further courses in psychology should consult a faculty member in the Department of Psychology, Cornell University, 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 Advanced Placement Examination in French or Spanish literature or in French or Spanish language.

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, students should 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, M46 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
M46 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 for serious revision—not mere editing—of essays. (At least some of these revising assignments may satisfy 1 and 2 above.)
4) ample classroom time spent on work directly related to writing
5) reading assignments small enough (about a hundred pages a week, at most) 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. 213–217).

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 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. Writing 137 and 138 are graded S-U only, and all students receiving a grade of S will be granted course credit towards graduation. Students whose writing displays sufficient competence will also be granted Freshman Seminar credit. The workshop also offers 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.

In the fall, students 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 executive staff assistant is Diane P. Freedman. The program's offices are in 159 Goldwin Smith Hall (telephone: 256-4061).

The Learning Skills Center

The Learning Skills Center (LSC) is a central academic support service at Cornell University. Its purpose is to assist students in the development of learning strategies, skills, and insights that lead to academic success. The Learning Skills Center serves any student who needs its program but places particular emphasis on special programs students, including students in HEOP, EOP, COSEP, or the Division of Unclassified Students. The LSC provides supplemental instruction in core courses (biology, chemistry, mathematics, physics) and tutorial and study sessions. A prefreshman summer program is available to COSEP students, which provides an opportunity to develop academic skills before fall enrollment. The LSC has study-hall accommodations and provides students access to typewriters, calculators, a reserve library, an examination file, audio study-tapes, and xeroxing.

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 is offered on reading and learning strategies through the College of Human Ecology. In addition, audio cassettes on these topics are maintained at the LSC, the Media Room of Uris Library, the reserve desk of Mann Library, and at the three student unions. The Reading and Study Skills Program is located in the Learning Skills Center, 375 Olin Hall.

Tutoring Services

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, students should call 256-5183 or stop at the IFC office, 210 Willard Straight Hall.

Study Abroad

An international study experience is recognized as a valuable educational opportunity for Cornell students. Although Cornell does not currently administer any study abroad programs during the academic year, information on the wide variety of programs sponsored by other educational institutions, as well as on direct enrollment in foreign institutions, is available at the Career Center and at the academic advising office in each college.

Agriculture and life sciences
Donald Burgett, 17 Roberts Hall
Architecture, art, and planning
Professor John Shaw, 127 Rand Hall
Arts and sciences
Assistant dean Beatrice Rosenberg, 55 Goldwin Smith Hall
Engineering
Associate dean Richard Lance, 167 Olin Hall
Hotel administration
Assistant dean James Eyster, 141 Statler Hall
Human Ecology
Bruce Harding, 154 Martha Van Rensselaer Hall
Industrial and labor relations
James McPherson, 101 Ives Hall

Descriptions of study abroad opportunities will be found under college and department sections in this publication.

Because participation in many programs requires the equivalent of two years of college-level foreign language study, students should plan to include language study in their schedules during the first two years. Admission to many foreign study programs requires a strong academic record, generally a B average or above.

Further information on study abroad may be obtained in the college advising offices, in the Center for International Studies, from the Career Center, or from the director of undergraduate studies in each department.

Field Study

Field service provides students with invaluable experience, integrating theory with practice. Most opportunities are offered through individual departments or colleges and are described in those sections.

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 a 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 audiotapes. 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 must make its academic and social resources 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, 234 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, 234 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." 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 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.

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

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 and EOP give 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:

Alpha Kappa Alpha
Alpha Phi Alpha
American Indian Science and Engineering Society
Asian American Coalition
La Asociación Latina
Black Bio-Medical Technical Association
Black Graduate Business Student Association
Black Graduate Student Association
Black Greek Council
Black Students United
Chinese Cultural Society
Le Club Haitien
Cornell Afrikan Students Association (CASA)
Cornell Chinese Dance Company
Cornell Chinese Students Association
Cornell Korean Society
Cornell Prison Project
Delta Sigma Theta
Ethos Yearbook
Hong Kong Student Association
The Ithaca Ethiopian Drought Committee
Kappa Alpha Psi
Mexican American Student Association (MASA)
Minority Industrial and Labor Relations Student Organization (M.I.L.R.S.O.)
Minority Undergraduate Veterinary Association
Minority Undergraduate Law Society
National Society of Black Engineers, C.U. chapter (N.S.B.E.C.U.)
North American Indians at Cornell (N.A.I.S.A.C.)
Omega Psi Phi fraternity, Delta Mu chapter
Pamoja-Ni Gospel Choir
Phi Beta Sigma fraternity
The South African Divestment Coalition
Sphinx Literary Society
State of Black America Coordinating Committee
Third World Student Programming Board
La Unidad Latina/Lambda Upsilon Lambda
West Indian Students Association
Zeta Phi Beta Sorority, Inc.

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. Because of 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. 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.

Before registration at the University, all students must present proof of adequate immunization against diphtheria, tetanus, rubella, measles, and poliomyelitis.

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, students may call 256-5208 or go to the center. Workshops are also offered on a variety of health-related and personal-growth issues. More information may be obtained by calling Health Education at 256-4782.

Cornell United Religious Work (CURW). Diverse religious staff and denominational advisers provide general, religious, premarriage, couples, or crisis counseling and are available day or night by contacting the office, 118 Anabel Taylor Hall (telephone: 256-4214).

Empathy, Assistance, and Referral Service (EARS). Trained volunteers staff a walk-in and telephone peer counseling service for individual counseling and referral. EARS counselors are also available to present workshops on a variety of topics, including communication and listening skills, stress management, sexual harassment and rape, and sexism, racism, and heterosexism: the experience of oppression. Students can walk in to 211 Willard Straight Hall or call 256-EARS.

Dean of Students' Office provides crisis intervention, short-term counseling, and referral for students with adjustment, personal, relationship, and off-campus housing concerns; faculty and staff consultation; communication skills training; and coordination of EARS, ALERT, and personal-growth workshops on various topics. The office is located in 103 Barnes Hall (telephone: 256-4221 or 256-3608).

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

Student Life and Activities

Dean of Students' Office

The primary aim of the Dean of Students' Office (DOS) 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, DOS assumes responsibility for organizing and supporting ad hoc groups to examine issues that cut across divisional boundaries, for example, racism, human relations, and alcohol abuse.

Another 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 DOS, including the *Cornell Calendar, Policy Notebook for Students, Faculty and Staff; Off-Campus Housing in the Ithaca Area; Graduate Life at Cornell;* and *A Guide to Workshops at Cornell*.

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. The $40 housing application fee does not apply to room rental, nor is it refundable unless lack of space prevents the offer of an assignment, in which case it will be refunded upon request.

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.

Residence life refund policies are listed in the section "Terms and Conditions for Single Student Housing" of the residence hall contract.

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

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.

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 sprees, or the Cross-Country Gourmet dinner series, which has won national acclaim. Menus are posted weekly.

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: 256-8581). 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 following services are usually offered on-site:

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 service
5) counseling services at the center and in the Psychological Service
6) allergy injections
7) immunizations, vaccinations, and inoculations for travel abroad
8) contraceptive care
9) health education
10) orthopedic care
11) physical examinations

Generally, the University Health Services' clinicians will coordinate off-site care. Referrals for specialty care may be made to private physicians or private health care facilities for hospitalization, consultation, surgical procedures, eye examinations for glasses, or prenatal or obstetrical care

There are fees for some of the services provided on-site and all of the services provided off-site. The student is also responsible for 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 $25,000 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. The extent of the reimbursement is controlled by the provisions of the insurance policy. 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 1984–85 will be approximately $150 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 parents' 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 services, 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 services 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 Dean of Students' Office. 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 and 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 advisor. 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 for Students, Faculty and Staff,* available from the Dean of Students' Office, details the principles and policies governing campus conduct.

A judicial advisor 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 Advisor 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 Advisor 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 advisor can be reached when the office is not open. Further information about the Office of the Judicial Advisor 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; 2:00–5:30 p.m., Sunday)

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 37 percent of the male undergraduate students, as members. There are fifteen sororities, with about eleven hundred students, or 24 percent of the female 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. Guided walking tours start from the Information and Referral Center, inside the main entrance of Day Hall, every day except Independence Day, the day preceding Thanksgiving Day through the following Sunday, and December 22 through January 1. During the January intersession and spring break it is advisable to call the center to confirm the schedule. The tours, which give a general introduction to the campus, leave at the times listed below:

April 1–October 31		*November 1–March 31*	
Weekdays:	11:15 a.m. 1:30 p.m.	Weekdays:	1:30 p.m.
Saturday:	11:15 a.m.	Saturday:	11:15 a.m.
Sunday:	1:00 p.m.	Sunday:	1:00 p.m.

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

The Cornell campus is served by a number of public transit routes during the day and evening. CU Transit, Inc., provides on-campus service as well as commuter services to outlying communities. Several community bus routes connect the University with other surrounding residential and commercial areas.

Information about CU Transit services and other transit services may be obtained by calling the Office of Transportation Services at 256-4628 or CU Transit at 256-3782. Schedules for on-campus and off-campus service are posted in bus-stop shelters and are 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 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 9:00 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 256-7404.

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.

Required Immunization

Before registration at the University all students must be prepared to present proof of adequate immunization against diphtheria, tetanus, rubella, measles, and poliomyelitis.

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	$60
4 weeks	70
5 weeks	80
6 weeks	90
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 the chart below for the 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	$10*	$10*
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
Graduate School of Management	$10 $10	
Summer Session and Extramural Courses	†	†
Division of Unclassified Students	$10	$10
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, however, permissible. Although there is no federal or state legislation that pertains to the manner in which graded work is to be returned to students, the returning of such materials should be handled in such a manner as will preserve the student's privacy.

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., Management, Law, Veterinary Medicine).

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

700-Level Course—graduate-level course.

800-Level Course—master's level, thesis, research.

900-Level Course—doctoral level, thesis, research.

Guide to Course Listings

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

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

Agriculture and Life Sciences
Architecture, Art, and Planning
Arts and Sciences
Biological Sciences
Engineering
Hotel Administration
Human Ecology
Industrial and Labor Relations
Nutritional Sciences
Officer Education

Group 2: Graduate professional divisions

Law
Management
Veterinary Medicine

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

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

It is not possible to keep this single-volume course list completely up-to-date. The most current information regarding course schedules, sections, rooms, credits, and registration procedures may be found 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
Total				16		42.0

To arrive at the term average, add the products (credits × quality points) and divide by the number of credit hours 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, 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 pysical disability, schedule conflicts, or excessive work load (employment exceeding twenty hours a week). The Gannett Health Center can provide certifications based on health, and the Financial Aid Office can provide certifications of employment. Students should see the Department of Physical Education and Athletics or their 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 for Students, Faculty and Staff.* Copies of this booklet are available in the Dean of Students' Office. 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 for Students, Faculty and Staff* for details of University policy.

Bursar Information

Tuition, Fees, and Expenses

Tuition for Academic Year 1984–85

Endowed Divisions

Undergraduate	
Architecture, Art, and Planning	
Arts and Sciences	
Engineering	
Hotel Administration	
Unclassified division	$9,600
Graduate	
Graduate School (with major chairman in an endowed division)	9,600
Professional	
Law School	9,920
Management	10,250

Statutory Divisions

Undergraduate	
Agriculture and Life Sciences	
Human Ecology	
Industrial and Labor Relations	
New York resident*	4,060
Nonresident*	6,784
Graduate	
Graduate School (with major chairman in agriculture, human ecology, or industrial and labor relations)	4,782
Graduate School—veterinary medicine	7,002
Professional	
Veterinary Medicine	
New York resident*	6,900
Nonresident*	8,184

Summer Session (1984)

Per credit	$195

Extramural Division

Per credit	$230

Other Tuition and Fees

In absentia fees	
Graduate	$200 per term
Undergraduate	$15 per term
Law and Management	$75 per term
Excess-hours tuition rate for students in statutory units taking extra endowed credits	
Per credit hour	$229.94

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

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

Fees and Expenses

Undergraduate applicants to Cornell pay a nonrefundable $40 application fee when submitting an application for admission. The graduate application fee is $35.

Acceptance Deposit

An acceptance deposit of $200, applicable to the University charges for the final semester at Cornell, is required of all entering undergraduate students. 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.

Tuition Refund Policy

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

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

Billing and Payment 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 17 if they plan

to register for the fall semester. University policy precludes the use of any current financial aid for payment of past-due charges.

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

For further information, students should contact the Office of the Bursar, Cornell University, 260 Day Hall, Ithaca, New York 14853 (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).

Accident and Sickness Insurance

The accident and sickness insurance charge on the August billing statement is for insurance for hospitalization, surgical fees, and major medical coverage for the period of August 28, 1984 through August 28, 1985. The cost of this insurance is lower than the average cost of comparable coverage under other group accident and health insurance policies. A brochure is included with the August bill.

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, 1984. Waivers cannot be processed after this date. If a waiver form is lost or destroyed, a replacement can be obtained by contacting the Gannett Health Center (telephone: 607/256-6363).

Tuition Refund 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 1¼ 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 without notice 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 fine for the returned check according to the following schedule:

Returned-Check Amount	*Fine*
up to $50	$10
$50.01–$200	15
in excess of $200	25

These charges will be subject to a *finance charge* at the rate of 1¼ 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.

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 *Financial Aid Information, 1984–85* as a guide. Brochures are also 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.

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 on the basis of changes in family financial circumstances, increased costs, and the availability of federal funds.

Applications for the 1985–86 academic year will be available from the Office of Financial Aid in December, 1984. Whether or not they are already receiving aid, undergraduates must submit applications by March 15, 1985. Students should consult the brochure *Financial Aid Information, 1985–86,* for further information.

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

Undergraduate 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, 203A Day Hall, Ithaca, New York 14853 (607/256-3497).

Graduate School: Graduate Financial Aid, Cornell University, 116 Sage Graduate Center, Ithaca, New York 14853 (607/256-4884).

Law School: Law School, Admissions and Financial Aid, Cornell University, Myron Taylor Hall, Ithaca, New York 14853 (607/256-6292).

Graduate School of Management: Graduate School of Management, Admissions and Student Affairs, Cornell University, 315 Malott Hall, Ithaca, New York 14853 (607/256-7248).

Veterinary college: New York State College of Veterinary Medicine, Cornell University, 101 James Law Auditorium (607/256-5454, ext. 2765).

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. Because Merit checks are received after tuition payments are due, the bursar gives a deferred credit each semester to cover the amount of these scholarships. When checks are received, they are either endorsed and credited against outstanding tuition balances or given directly to the recipients.

Other scholarships from sources outside the University are considered as part of the financial aid award. With the exception of state and federal grants and faculty tuition benefits, the first $500 of any outside scholarship will be used to reduce expected self-help (loan or job). Fifty percent of the remaining amount will also be used to reduce self-help, while the remaining fifty percent will reduce University scholarship aid. Those 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 1983 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).

The Cornell Tradition

Made possible through the generosity and support of alumni and friends of the University, the Cornell Tradition rewards men and women who demonstrate a commitment to working and funding a portion of their own education.

There are four major components of the Cornell Tradition: the Freshman-Transfer Fellowship, awarded for a student's first year at Cornell; the Academic Year Fellowship, awarded to continuing students; the Summer Fellowship, which helps replace summer savings when a student cannot meet the summer savings expectation because he or she has accepted a career-related summer job away from home, thus incurring extra travel and living expenses; and the Summer Job Network, through which wages are subsidized to encourage employers in both private industry and the public sector to create summer jobs for Cornell students. While placement in summer jobs developed through the Summer Job Network is available to all undergraduates regardless of financial need, the fellowships are awarded only to financial aid recipients.

Freshman-Transfer Fellows are nominated during the admission process. Continuing students apply for consideration for the Academic Year Fellowships annually during the spring term. Selection is based on achievement, initiative, leadership, scholarship, and the willingness to work. Those selected receive up to $2,000 to reduce the recommended loan portion of their financial aid package for the following year. More information about the Cornell Tradition can be obtained from the Student Employment Office, 203A Day Hall.

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.

Financial and Employment Counseling Services

Counseling on individual financial aid problems and questions is offered by full-time, trained counselors in the Financial Aid Office. Appointments may be made at the main window of the Financial Aid Office, located in 203 Day Hall. Parents are also welcome, though it is suggested that arrangements be made in advance of the visit to campus. In addition, peer advisers are available at the Financial Aid Office's main window to answer routine questions regarding application procedures and sources of aid.

Students and parents with questions regarding on- or off-campus employment, college work-study, or the Cornell Tradition may make an appointment to see an employment counselor at the Student Employment Office, located in 203A Day Hall.

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.

Common Learning Courses

The objective of Common Learning courses is to enable students to acquire new knowledge about problems of significance to contemporary society and to examine these problems from a variety of intellectual perspectives. This dual objective implies challenging students to learn to define problems, gather relevant evidence, organize and interrelate materials, and present findings and conclusions both orally and in writing. The findings should include a systematic evaluation of alternative solutions, including assessment of their social and ethical implications. At every stage of the inquiry, course activities are expected to adhere to the canons of evidence and reason.

Common Learning courses will be open only to juniors and seniors but will include students from a diversity of majors and a range of schools and colleges. Class size will normally not exceed twenty students. The limitation on class size and the diversity of students should encourage undergraduates with different training and interests to exchange knowledge with each other as well as with the professor responsible for the course. Courses will be designed and taught by a single member of the faculty, although consultation with, and course participation by, colleagues in other disciplines is expected and encouraged. Further information on courses to be given this academic year may be acquired from the student's college office or from the Vice Provost's Office, 309 Day Hall.

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
Norman R. Scott, director of research
Lamartine F. Hood, director of the New York State Agricultural Experiment Station (Geneva)
Brian F. Chabot, 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, Cathy Thompson
Records: Tom Wakula
Registrar: Ruth Stanton
Scheduling: Cathy Place
Admissions: Richard Church, Mary Grainger, Nancy Rehkugler, Jennifer Battle
Career development: William Alberta
Special projects: Eunice Paddio-Reed

Department Chairmen

Agricultural economics: O.D. Forker, Warren Hall
Agricultural enngineering: N. R. Scott, Riley-Robb Hall
Agronomy: R. F. Lucey, Emerson Hall
Animal science: J. M. Elliot, 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 Science 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 Science Building
Pomology: G. H. Oberly, Plant Science 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 Science Building

Facilities

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

Degree Programs

The College of Agriculture and Life Sciences offers programs leading to the degrees of Bachelor of Science, Master of Science, and Doctor of Philosophy 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 Degrees

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 graduate fields of instruction with primary affiliation in Agriculture and Life Sciences are as follows (the name of the graduate field representative is given with each program):

Agriculture [M.P.S.(Agr.)]; G. Conneman, Roberts Hall
Agricultural Economics; R. Boisvert, Warren Hall
Agricultural Engineering; L. Albright, Riley-Robb Hall
Agronomy; J. Duxbury, Bradfield Hall
Animal Breeding; L. Van Vleck, Morrison Hall
Animal Science; H. Hintz, Morrison Hall
*Biochemistry, Molecular and Cell Biology; P. Hinkle, Wing Hall
*Botany; A. Jagendorf, Plant Science Building
Communication Arts [M.P.S.(C.A.)]; R. Ostman, 640 Stewart Avenue
Development Sociology; F. Buttel, Warren Hall
*Ecology and Evolutionary Biology; P. Marks, Corson Hall
Education [also M.A.T.]; R. Bruce, Stone Hall
Entomology; W. Tingey, Old Insectary
Environmental Toxicology; S. Bloom, Rice Hall
Floriculture and Ornamental Horticulture; R. Langhans, Plant Science Building
Food Science and Technology; W. Jordan, Stocking Hall
*Genetics; A. Blackler, Emerson Hall
International Agriculture and Rural Development [M.P.S.(Agr.)]; E. Oyer, Roberts Hall
Landscape Architecture [M.L.A.]; L. Mirin, E. Sibley Hall
Microbiology; R. Mortlock, Stocking Hall
Natural Resources; W. Youngs, Fernow Hall
*Neurobiology and Behavior; H. Howland, Seeley Mudd Hall
Nutrition; L. Wright, Savage Hall
*Physiology; D. Tapper, Veterinary Research Tower
Plant Breeding and Biometry; R. Plaisted, Emerson Hall
Plant Pathology; M. Zaitlin, Plant Science Building
Plant Protection [M.P.S.(Agr.)]; P. Arneson, Plant Science Building
Pomology; F. Liu, Plant Science Building
Vegetable Crops; P. Ludford, Plant Science Building

* Division of Biological Sciences

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.

Departments in the College of Agriculture and Life Sciences sponsor the Bachelor of Science degree in the following major fields of study. Students should consult with the program coordinator regarding opportunities for specialization and concentrations within the major field of study.

Agricultural Economics (D. Goodrich, 254 Warren Hall)

Agricultural Engineering: Environmental Technology (D. Haith, 308 Riley-Robb Hall)

Agronomy: Crops, Soils, Weeds (G. Fick, 505 Bradfield Hall); Agricultural Meteorology (W. Knapp, 1111 Bradfield Hall)

Animal Science (J. Pollak, B-22 Morrison Hall)

Biological Sciences, Division of (H. Stinson, 200 Stimson Hall)

Communication Arts (D. Schwartz, 307 Roberts Hall)

Education (G. Posner, 111 Stone Hall): Agricultural Education (W. Drake, 204 Stone Hall)

Entomology (E. Raffensperger, 125 Comstock Hall)

Floriculture and Ornamental Horticulture (K. Mudge, 13 Plant Science Building): Landscape Architecture (M. Adleman, 230 East Roberts Hall)

Food Science (J. Sherbon, 207 Stocking Hall)

Microbiology (P. VanDemark, 413 Stocking Hall)

Natural Resources (H. Brumsted, 206E Fernow Hall)

Plant Science Departments (J. Lorbeer, 424 Plant Science Building): Breeding, Pathology; Pomology, Vegetable and Field Crops

Rural Sociology (H. Capener, 117 Warren Hall)

Statistics and Biometry (C. McCulloch, 338 Warren Hall)

Special Agricultural Programs: American Indian Studies (R. Fougnier, Stone Hall); Cooperative Extension (G. Broadwell, 212 Roberts Hall); General Agriculture (G. Conneman, 192 Roberts Hall); International Agriculture (E. Oyer, 261 Roberts Hall)

Summary of Basic College Requirements for Graduation

1. Total Credit Hours

a. A minimum of 120 credit hours.
b. A minimum of 100 credit hours taken for a letter grade.
c. A minimum of 105 credit hours for "regular" course work. This excludes all independent study, field and work experience, and internships.
d. Credit received for physical education and credit for certain other courses such as Mathematics 109 and ALS 005 do not count toward the 120 hours minimum.
e. A minimum of 55 credit hours must be from courses offered by the College of Agriculture and Life Sciences.
f. A maximum of 55 credit hours may be from the endowed colleges without incurring additional tuition charges.

2. Residence

a. 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. Each semester of residence is to be as a full-time student (minimum of 12 credits per term).

   Students who have at least seven semesters in residence at Cornell, including two in Agriculture and Life Sciences, and who have eight or fewer hours remaining for graduation may petition the Committee on Academic Achievement and Petitions for approval to complete this work elsewhere.
b. External transfer students must complete a minimum of 60 credits at Cornell.
c. Internal transfer students must be in residence in the college for a minimum of two semesters. Residency in the Division of Unclassified Students (DUS) does not count toward this residence requirement.

3. Distribution

36 credits. The purpose of the distribution requirement is to acquaint students with a broad range of subject matter that undergirds scholarly study and research in agriculture and the life sciences. Four areas are designated, for which a minimum of nine credits of study must be completed in each

Credits received for independent study, field or work experience, and internships cannot be used to fulfill this requirement. Letter or S-U grades may be used. Courses judged to be remedial in the discipline (e.g., ALS 005) will not be counted. Students should consult with their faculty advisers for appropriate courses and options in each area.

Group A: Physical Sciences

9 credits, including courses in each of the two categories. (See groups 2 and 3, pages 96–97.) mathematics. (See mathematics requirement.)

Group B: Biological Sciences

9 credits.

Group C: Social Sciences and Humanities

9 credits, including courses in each of the two categories. (See groups 2 and 3, pages 96–97.)

Group D: Written and Oral Expression

9 credits, including 6 credits in written expression.

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 is to 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. Physical Education

Completion of the University requirement (see p. 22). The credit received for physical education does not count toward the 120 credits 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).

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.

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.

Students

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 chairpersons 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 11 percent are identified as members of minority-ethnic groups.

Transfer Students

Any student who has withdrawn from one college and has been accepted in another 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 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, 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 résumé 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 Students

All students in the College of Agriculture and Life Sciences are expected to be enrolled as full-time students in a registered program of study. Part-time students must register in the Division of Summer Session, Extramural Courses, and Related Programs. The Continuing Education Center, 103 Barnes Hall, provides information, counseling, and special programs for mature students throughout the University (telephone: 256-4987).

Off-Campus Students

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

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. 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 are recommended by the College Scholarship Committee and processed 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.

Academic Procedures and Policies

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

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

1. Students assume responsibility for the content and integrity of the work they submit, such as papers, examinations, or reports.
2. Students are guilty of violating the code if they
   - knowingly represent the work of others as their own;
   - use or obtain unauthorized assistance in any academic work;
   - give fraudulent assistance to another student;
   - fabricate data in support of laboratory or field work;
   - forge a signature to certify completion or approval;
   - knowingly deprive other students of library resources, laboratory equipment, computer programs, and similar aids;
   - in any other manner violate the principle of absolute integrity.
3. Faculty assume responsibility to make clear to students and teaching assistants specific regulations that apply to scholarly work in the discipline.
4. Faculty fulfill their responsibility to
   - maintain in all class, laboratory, and examination activities an atmosphere conducive to academic integrity and honor;
   - make clear the conditions under which examinations are to be given;
   - make clear the consequences of violating any aspects of the code;
   - provide the opportunities in which students are encouraged to discuss the content of courses with each other and to help each other to master it and to distinguish these activities from the course assignments that are meant to test what the students can do on their own without help from others;
   - state explicitly the procedures for use of materials taken from published sources and methods, appropriate to the discipline, by which the student must cite the source of such materials;
   - approve in advance, when appropriate and in consultation with other faculty members, which work submitted by a student and used by a faculty member in the determination of a grade in a course may be submitted by that student in a different course;
   - monitor the work and maintain such records as will support the crucial underpinning of all guidelines: the students' submitted work must be their own and no one else's.

Course Enrollment

Procedures for University registration and course enrollment are described on page 20. To enroll in courses, students pick up materials from the college 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 vertification 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.

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 the graduation requirements.

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 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.

Add/Drop/Change

An official period during which students may add, drop, or change courses 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, students wishing to withdraw from a course must petition to the college 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.

Progress toward the Degree

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

- 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;
- receives and acts upon petitions from individual students asking for exceptions from particular academic regulations or requirements of the college, or for reconsideration of action previously taken by the committee;
- acts upon readmission requests from persons whose previous enrollment was terminated by the committee;
- notifies the petitioner in writing of the action taken by the committee 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 attain 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.

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 New York 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*.

The programs reflect the major academic effort in the college. Faculty curriculum committees in each field identify a core or sequence of courses appropriate to all students studying in that field. Courses of study are designed to provide systematic development of basic skills and concepts. Opportunity for specialization in an area of particular interest is usually available.

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.

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:

	Credits
A. Basic Subjects	
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:

	Credits
A. Basic Subjects	
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	
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

Agronomy and Meteorology

Crop science, meteorology, soil science, and weed 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 curriculum satisfies the basic requirements for

employment as a professional meteorologist and provides a sound background for graduate study or work in the numerous specialized areas of meteorological science. Students are encouraged to choose additional course work in related or 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.

Weed science is a specialization within agronomy, shared among a number of departments. Students may also specialize in interdepartmental programs in general plant science, plant protection, or general agriculture.

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 strongly urged 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 Management in their senior year. For information, those interested should 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 core courses in the Department of Agricultural Economics and additional courses in an optional area of concentration. The following core courses are generally required in all specializations in applied economics and business management:

Course	*Credits*
Ag Ec 150, Economics of Agricultural Geography	3
Ag Ec 220, Introduction to Business Management	3
Ag Ec 221, Accounting	3
Ag Ec 240, Marketing	3
Ag Ec 310, Introductory Statistics	3

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.

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 have the opportunity to learn both the social science underlying human communication and the most effective means of adapting written, interpersonal, audio, and visual communication to audiences. The curriculum emphasizes learning communication theory along with communication skills.

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 courses that includes Writing for the Mass Media, Theories of Human Communication, Introduction to Mass Media, and Oral Communication.

Public communication prepares students for careers as communication, information, or public relations specialists in a wide variety of organizations. Required courses for this sequence include communication planning and strategy, survey research, communication in organizations, and visual communication. There is heavy emphasis on developing writing skills.

Publication provides an excellent background for working as an editor or writer in virtually any organization. Such positions might include preparing annual reports, editing an employee newspaper, writing sales or marketing literature, or writing news stories. Required courses for this sequence are taken in writing, media law, publication design, and communication theory. 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 administrator, training, and a variety of sales and consulting positions. The sequence also may be used to prepare for graduate study in communication and other 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.

In addition to the requirements for a sequence, a concentration of at least 12 credits outside the department is required. The concentration helps orient students to a communication career in either a business, government, education, or public service organization or to a very specific profession such as agribusiness public relations or science journalism.

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

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 educational programs. Students specializing in the program area take a core curriculum:

1) a course in general psychology (e.g., Education 110),
2) a course in educational psychology (e.g., Education 311),
3) a course in the social-historical and philosophical foundations of education (e.g., Education 370, 472),
4) a field experience (e.g., Education 420, 430).

Two specializations are available at the undergraduate level.

Agricultural education leads to teaching agriculture in secondary schools and two-year colleges, positions in extension education, and educator jobs in agricultural industry. It 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 with people is essential.

Certification is required to teach in public secondary schools. Agricultural certification areas are agricultural mechanization, conservation, farm production and management, horse handling and care, ornamental horticulture, and small animal care. Provisional certification, good for five years, may be earned by completion of an approved curriculum, including a student teaching experience, leading to the baccalaureate degree. A passing grade on a state teacher's test is also required. Permanent certification requires a master's degree. Persons with a baccalaureate degree in technical agriculture may earn certification through a master's degree in agricultural education.

Directed field experiences, internships, and selected education courses are used to prepare students for agricultural educator positions not requiring certification.

Further information is available from the agricultural education coordinator, Stone Hall (telephone: 256-2197).

General education options not leading directly to certification are available. By selecting courses in the Department of Education, students can prepare for positions in areas such as counseling, youth group leadership, cooperative extension, and the Peace Corps. Students can also prepare themselves for graduate programs in science education, environmental education, educational psychology, research methods, extension, adult and continuing education, and the social/economic/legal/philosophical foundations of education. Although this option does not provide for certification in science teaching, it can make students eligible for admission to graduate programs that, in turn, lead to this certification.

Students with interest in general careers other than those listed above will find that courses offered by the Department of Education can be used to provide appropriate study to supplement specializations in their subject area. Combined with courses in the other social sciences, especially communication arts, such a program provides a useful base for careers that involve strong working relationships with people.

Students should contact the education coordinator, Stone Hall (telephone: 256-6524).

Entomology

The intent of this specialization is to provide students with a basic background in the biological and environmental sciences, with a special emphasis on the study of insects. Many students in this specialization pursue graduate studies in entomology or related sciences upon completion of the B.S. degree, and the requirements are based on a preprofessional degree. Those who do not anticipate graduate training are urged to select electives of immediate value to the careers they plan. Some suggestions are made in section B below.

A. Specific Requirements

Basic Sciences
College mathematics, including calculus
A course in physics
Chemistry 103–104 or 207–208
Chemistry 253 (organic)

General Biology
Introductory biology
Biological Sciences 330 or 331, Principles of Biochemistry
Biological Sciences 311, Introductory Animal Physiology
Biological Sciences 281, Genetics, or Plant Breeding 225, Plant Genetics
Biological Sciences 221, Neurobiology and Behavior
Biological Sciences 360, General Ecology

Entomology
Entomology 212, Insect Biology, or 241, Applied Entomology
Entomology 322, Insect Morphology
Entomology 331, Insect Taxonomy

Two courses selected from the groups below. Both may not be from the same group:

Group a
Entomology 444, Integrated Pest Management
Entomology 677, Biological Control
Entomology 690, Insect Toxicology and Insecticidal Chemistry

Group b
Entomology 455, Insect Ecology
Entomology 471, Ecology and Systematics of Freshwater Invertebrates
Entomology —, Insect Behavior (in planning)

Group c
Entomology 452, Medical Entomology
Entomology 452, Insect Pathology
Entomology 483, Insect Physiology

B. Suggested Electives

The choice of electives should reflect a student's particular interests within entomology, especially whether they run towards the impact of insects on human welfare or towards the more basic aspects of insect biology. Courses in botany, evolution, invertebrate zoology, microbiology, cell biology and histology, vertebrate biology, statistics, foreign languages, scientific writing, oral communication, plant pathology, and other areas of agriculture are also recommended.

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:

Flor 100, Introduction to Floriculture and Ornamental Horticulture
Flor 213, Woody Plant Materials
Flor 312, Garden and Interior Plants I
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
Pl Pa 301, Introductory Plant Pathology

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

With permission of 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 200, LA 224, LA 240, and LA 331. Freehand drawing courses may not be applied to this requirement.

Students also are 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 two specialization areas. Students wishing to prepare for graduate study in horticulture may develop a program in basic sciences and their application in horticulture science. Lists of recommended courses for the areas of specialization are available from student advisers.

The program 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 also are 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.

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, Cornell University, 13 Plant Science Building, Ithaca, New York 14853 (telephone: 607/256-3139).

The department's main office is in Plant Science Building 20. Other departmental facilities include classrooms and laboratories in the Plant Science Building, greenhouse and laboratory facilities at the Kenneth Post Laboratory, the test garden, the Turfgrass 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.

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 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.

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

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

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

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

Landscape Architecture

Landscape architecture is sponsored by the Department of Floriculture and Ornamental Horticulture and 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.

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

An option for study abroad in Denmark is incorporated into the spring semester of the junior year. Under a special arrangement between Cornell University and the University of Copenhagen, landscape architecture majors who have completed three semesters of design, and who have a cumulative average of 3.0 or above, have the option of participating in the Denmark International Study Program in lieu of a semester at Cornell. Students register for the spring semester at Cornell in absentia and participate in a uniquely developed architecture and design studies curriculum in the Denmark program. This program is administered through the Office of International Programs of the State University of New York.

Curriculum

First Year—Fall Term	*Credits*
*LA 220, Principles of Landscape Architecture	3
†Arch 181, History of Architecture I	3
†Bio S 109, Biological Principles	3
†Freshman humanities elective	3
†Distribution elective in mathematics	3
	15

First Year—Spring Term	
†Arch 182, History of Architecture II	3
†Bio S 110, Biological Principles	3
†Geol 101, Introductory 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 201, Oral Communication	3
†Distribution elective	3
(Optional landscape architecture study abroad in Denmark)	
	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
‡Agron 360, Earth Resources Inventories	3
†Distribution elective	3
†Distribution elective	3
	15

Summary of credit requirements:	
*Specialization requirements	69
†Distribution electives	42
‡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 a thesis or final project.

A minimum academic achievement of a B– average is required of undergraduates and a B average for graduates in all core curriculum courses of the Landscape Architecture Program as a prerequisite for entering the 300/600-level design studios in landscape architecture.

An option for study abroad in Denmark is incorporated into the spring semester of the second year.

Curriculum

First Year—Fall Term	*Credits*
*LA 501, Studio: Design Fundamentals	6
*LA 500, Graduate Orientation Seminar	1
*LA 205, Graphic Communication I	3
*LA 220, Principles of Landscape Architecture	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
‡Agron 360, Earth Resources Inventories	3
	15

Third Year—Fall Term	
*LA 607, Studio: Professional Practice (Alternative: LA 601 or 603)	3
*LA 609, Studio: Advanced Site Design (Alternative: LA 602 or 604)	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)	14
	90

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.

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.

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, 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, ethics, 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.

Students need not select an area of concentration, but those who wish to do so may specialize further in wildlife science, forest science, aquatic science, and fishery science.

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

Plant Sciences

Plant sciences 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.

Plant sciences is a multidepartmental program area, sponsored 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.

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 agronomy, floriculture, and biological sciences. In addition, an interest in plant science can be combined with some other area of specialization such as agricultural engineering, education, extension, statistics, international agriculture, food science, or agricultural economics.

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 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 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 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 agrichemical company, or with a regulatory agency is encouraged.

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.

Recommended Courses	*Fruit Production Option*	*Pomology Option*
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 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.

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.

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).

Special Agricultural Programs

Some students are interested in pursuing a broad general education in agriculture and the life sciences; others are uncertain about their career objectives. Such students, in cooperation with their faculty advisers, plan a program sequence suited to their individual interests, abilities, and objectives.

Study must be planned with and approved by a college faculty adviser. Information on these options is available in the Office of Student Affairs, 17 Roberts Hall.

American Indian Studies

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

The Indian Traditions
Anth 230, Ethnology of Native North America
Anth 354, The Peopling of America

Indians in Transition
ALS 318, Ethnohistory of the Northern Iroquois (also Anth 318)
Hist 119, History of North American Indians
Hist 209, Political History of American Indians
Hist 323–324, Native American History
Hist 429, American Indians in the Eastern United States

Contemporary Issues
R Soc 175, Issues in Contemporary American Indian Societies
R Soc 242, American Indian Philosophies I: Power and Word Views (also Anth 242)
R Soc 243, American Indian Philosophies II: Native Voices (also Anth 243)
R Soc 367, American Indian Tribal Governments (also Anth 367)
R Soc 440, Social Impact of Rapid Resource Development
R Soc 442, American Indian Philosophies: Selected Topics (also Anth 442)

Independent Study
Independent study courses within departments; students must have approval of an American Indian studies faculty member.

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.

Specialization	*Adviser*
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. Schaufler
All other areas	G. Broadwell

General 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.

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 Services 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).

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. An application form is available from the college registrar, 192 Roberts Hall, or from the area committee chairperson. Written approval of the faculty member who will direct the research and of the honors committee in the area is required. After the college registrar verifies the student's grade-point average, the student will be officially enrolled in the honors program.

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

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

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 chairperson.

Biological Sciences

Faculty committee: R. MacIntyre (genetics and development), chairman; R. Corradino (animal physiology and anatomy), C. Hall (ecology and systematics), E. Adkins Regan (neurobiology and behavior), J. Roberts (biochemistry, molecular and cell biology), R. Turgeon (plant biology), 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; E. J. Hagedorn, R. A. Morse, B. Peckarsky, 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.

- Presents 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, the student is expected 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 the 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 Sciences

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 chairperson of the physical science honors committee.

Plant Sciences

Faculty committee: M. Petrovic, chairman; L. Creasy, R. L. Obendorf, C. Wien, R. P. Korf, S. Zinder

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 chairperson 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: M. Petrovic, chairman; L. Creasy, R. L. Obendorf, C. Wien, R. P. Korf, S. Zinder

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 will extend it. Students may, however, register for independent study in conjunction with an honors project.

Reports must be written according to the form of any standard journal within the appropriate fields. Four copies of the report should be submitted to the chairperson of the committee no later than three 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.

Intercollege Programs

The College of Agriculture and Life Sciences *does not* participate in any dual degree programs.

Students who have been accepted in the College of Veterinary Medicine may double-register in their seventh and eighth semesters and complete requirements for the Bachelor of Science degree in the College of Agriculture and Life Sciences. Students should consult with the college registrar, 192 Roberts Hall, to assure that degree requirements have been fulfilled before the B.S. degree will be awarded.

American Indian Program

The American Indian Program (AIP) 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 AIP 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.

An important component of the program is working with American Indian students at Cornell. Using a team approach in providing support, AIP works with the student from the initial recruitment and admissions process through to the completion of his or her academic career at Cornell. The team approach means that the families and communities of the students are included as an important part of the support network for the students. By working together, the program can assure the success of the students in completing their studies and receiving the Cornell degree. The program counseling staff are Indians and experienced in working with Indian people.

A specific objective of the AIP is to assist Indian groups and organizations in their efforts to address the issues they face. The thrust of the AIP research and extension efforts is directed at developing solutions to problems identified by Indian people. In this way the AIP 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 AIP 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.

For more information, students should contact Raymond Fougnier, Director, American Indian Program, 215 Stone Hall (telephone: 256-6587).

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. The undergraduate nutrition major is based in the College of Human Ecology. Fields in CALS closely related to nutritional sciences include animal sciences, food industry management, food science, microbiology, pomology, and vegetable crops. Students may also pursue a nutrition emphasis by planning a concentration in biological sciences, option 8, or by planning a program in general agriculture that includes a nutritional component. For more information, see Division of Nutritional Sciences, page 000, or consult with the Office of Student Services, 17 Roberts Hall, for referral to a division adviser.

Off-Campus Study Programs

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

The Intent to Study Off-Campus form should be filed with the college registrar at the time of preenrolling for courses. Tuition is prorated for off-campus study. In some cases stipends are provided to help defray living expenses. Students receiving financial aid should consult with the Office of Financial Aid prior to leaving campus and should be sure that accounts have been cleared with the bursar in order to receive credit.

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.

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.

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.

Cornell-in-Washington

Students apply for the Cornell-in-Washington program through the Department of Government, 134 McGraw Hall. CALS students admitted to the program should fill in the off-campus study form and preenroll for courses to be taken while off campus. Approval of one's academic faculty adviser must be secured when preenrolling for courses to assure that the courses are appropriate for the degree program being pursued. Courses and seminars in the Cornell-in-Washington program that carry college credit are taught in agricultural economics and communication arts.

Internships

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

A maximum of 15 credits of the 120 required for the degree may be taken in internships and/or independent study courses.

The College of Agriculture and Life Sciences *does not* offer a field study option.

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.

Mexican exchange program. Two students from the college are competitively selected in the freshman year to go to the Instituto Tecnologico 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 progam with respect to finances.

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 8 or 12:20.
H. A. Geiselmann 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 C. Place, Scheduling, 192 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 and assemble in 192 Roberts Hall.
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. Fougnier.
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. Geiselmann, 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 computing language BASIC is taught and used to strengthen and integrate the mathematical topics covered.

ALS 318 Ethnohistory of the Northern Iroquois (also Anthropology 318) Spring. 3 or 4 credits.
T R 10:10–11:25. S. Saraydar.
The development of Iroquois (Hodenosaunee) culture patterns is examined in depth from the prehistoric Archaic period to the present day. Changes in cultural ecology, social organization, and world view are examined. Supplemental information is drawn from accounts of neighboring groups in southern Canada and western New England. Approximately one-third of the course is devoted to contemporary issues faced by the Iroquois people.

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 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. 3 credits. Prerequisite: permission of instructor.
M 12:20. 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. 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, N. L. Bills, D. Blandford, R. N. Boisvert, R. Boynton, J. Brake, K. Bryant, 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. Herdt, R. B. How, M. Hubbert, 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, R. D. Robbins, 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. Two evening prelims. 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.
Lecs, M W F 10:10 or 11:15; 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, 2:30–4:25, 7:30–9:25 p.m.; R 8–9:55 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. Two evening prelims. R. D. Aplin.
Principles and tools useful in performing four major functions of management: planning, organizing, directing and leading, and controlling. Within this framework, consideration is given to social, legal, and economic environments; forms of business ownership; financial statements; cost behavior; and a few key concepts and tools in financial management.

221 Financial 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. M. Hubbert.
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.

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 acid rain and climate change, renewable resource use, and taxation.

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. Staff.
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 juniors, seniors, and graduate 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 juniors, seniors, and graduate 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, 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 12:20 or 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. Three evening prelims. M. Hubbert.
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, accounting for inflation, and accounting in the manufacturing environment.

324 Financial Management Spring. 4 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 or R 9:05–11, 12:20–2:15, or 2:30–4:25, or F 12:20–2:15. 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 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 101 or equivalent.
Lecs, T R 1:25–3:20. 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, promotion, and channel selection. Identification and generation of economic data necessary for marketing decisions are considered.

346 Dairy Markets and Policy Spring, weeks 1–9. 2 credits. Limited to juniors and seniors. Prerequisite: Economics 101.
Lecs, T R 8–9:55. 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. Prerequisites: Mathematics 111 and Economics 101.
Lecs, T R 10:10; disc, M or T 2:30–3:20. Staff.
This course develops economic models for renewable resources, exhaustible resources, and environmental quality. Applications to fisheries, forestry, oil and gas, and air and water pollution are presented. Emphasis is on the microeconomic foundations in resource economics and the policy implications for resource management.

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, and leasing.

406 Farm and Rural Real Estate Appraisal Spring, weeks 8–15. 2 credits. Limited to 40 students. Prerequisites: Agricultural Economics 302 or equivalent *and* permission of instructor.
Lec, R 11:15; lab, R 1:25–5:30. Five half-day field trips, one all-day field trip. G. J. Conneman.
The basic concepts and principles involved in appraisal. Factors governing the price of farms and rural real estate and methods of valuation are studied. Practice in appraising farms and other rural properties.

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 week in intersession). 1 credit. 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 M in September). 1 credit. Prerequisite: Agricultural Economics 302 and 405, and permission of instructor.
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 3:35–5:30. 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. D. R. Lee.
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 juniors, seniors, and graduate 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 juniors, seniors, and graduate 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. Cannot be taken by students who are enrolled in or who have taken Agricultural Economics 421. S-U grades only.
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 Cooperative Management 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 and 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. D. Blandford.
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. W. G. Earle.
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 10:10–11:25. E. W. McLaughlin.
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 Applications in Strategic Marketing Fall. 2 credits. Prerequisites: Agricultural Economics 342, previous enrollment or concurrent registration, or permission of instructor. Field trips will cost approximately $200.
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. 20–23, 1985). Grades are not registered until February. B. Anderson, E. McLaughlin.
Focuses on the major components of strategic marketing: product mix, distribution, pricing, advertising and promotion, and market research. Students are given firsthand exposure to a wide range of marketing strategies through field trips, guest lectures, case studies, a simulated marketing game, and development of a strategic marketing plan.

450 Evaluating Resource Investment 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.
M 1:25–4:25; 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, definitions of environmental quality, questions of political economy, and public project and program applications.

452 Land, Real Estate, and Mineral Economics Spring. 3 credits.
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, food security, and related 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 or 405, or equivalent. Offered alternate years.
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. Staff.
This course is about markets for agricultural products: their distinguishing characteristics, criteria for evaluating performance, models of price determination, farm-retail marketing margins, and selected public-policy issues related to market performance. Agricultural Economics 641, 740, and 741 cover additional dimensions of agricultural markets.

641 Time in Agricultural Markets Fall, weeks 8–14 (begins Oct. 23). 2 credits. Prerequisites: Agricultural Economics 415 and 416 or equivalents. Recommended: Agricultural Economics 640.
Lecs, T R 12:20–2:15. W. G. Tomek.
This course is primarily about markets for agricultural futures contracts. Emphasis is placed on price behavior on cash and futures markets and the relationships among prices. These principles provide a foundation for a discussion of hedging, speculation, and public-policy issues.

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.

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. 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 1984–85.
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. Offered alternate years. Not offered 1984–85.
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. Not offered 1984–85.
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 discussed when time permits. 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.
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 applying 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, and coordination systems in agriculture.

741 Methods of Trade and Commodity Policy Analysis Spring, weeks 8–14. 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. D. Blandford.
The nature, use, and usefulness of alternative quantitative methods of trade and commodity policy analysis. Principal topics are the analysis of export supply–import demand for a single country, international commodity models, and macroeconomic models of commodity trade.

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. Not offered 1984–85.
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.
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, R. C. Loehr, H. A. Longhouse, D. C. Ludington, T. G. Miller, W. F. Millier, R. A. Parsons, R. E. Pitt, G. E. Rehkugler, 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; labs, (fall) M or T 1:25–4:25; (spring) 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 R 1:25; rec, T 8, R 8, or F 1:25, 2:30, or 3:35.
J. R. Cooke.
This course provides an introduction to computing using microcomputers. In addition to the structured programming language Pascal, applications such as word processing, bibliographic searches, data base management, spreadsheet, statistics, and symbolic mathematics will be covered using agricultural engineering and related topics.

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 with 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 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** Fall. 3 credits. Prerequisite: high school or college physics. S-U grades optional. Offered alternate years. Not offered 1984–85.
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-rec, T R 8:15–9:55. 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.
Lec-rec, T R 8:15–9:55. 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.
Lab, M 1:25–4:25; lec, M 12:20, R 11:15.
T. G. Miller.
Principles and practice of measurement of distance, elevation, and direction. Use and care of equipment is stressed during field problems related to mapping, engineering design, and construction. Other topics include surveying specifications, standards of accuracy, and 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 Spring. 4 credits. Each lab section limited to 20 students. 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, 2:30–3:20, or 3:35–4:25. Prelims: 7:30 p.m. Feb. 28 and April 16. R. B. Furry.
An introductory course in computing for those interested in using digital computers to handle data. Topics include preparing and processing computer programs. 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 F 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 Engines and Tractors for Agricultural Applications Spring. 3 credits. Each lab limited to 16 students. Students missing the first week of classes without permission of the instructor are dropped so others may register. Prerequisite: high school physics or equivalent.
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 internal combustion engines and tractors. Topics include engine cycles, fuels, lubricants, carburetion, fuel injection systems, ignition, charging circuits, valve reconditioning, engine testing, transmissions, traction, and human factors in tractor operation.

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 Spring 3 credits. S-U grades optional.
M W F 9:05. K. G. Gebremedhin.
A study of layout, material handling and selection, and environment associated with agricultural production on the farmstead. Planning and design considerations 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 11:15. K. G. Gebremedhin.
Structural design of buildings used for farmstead production systems. Wood is emphasized as a structural material.

371 Soil and Water I: Hydrology, Erosion, and Chemical Movement in the Landscape Fall. 3 credits. Prerequisites: knowledge of soils, one semester of computer programming, and one year of calculus.
Lec, T R 9:05; lab, R 1:25–4:25. T. S. Steenhuis.
Introduction to basic hydrologic processes that focuses on the description of water behavior in landscapes and how management influences that behavior. The interaction of hydrologic processes with erosion, sediment, and chemical transport processes is discussed. Emphasizes basic understanding and probabilistic nature of the processes involved. Case studies are used to illustrate the interaction. Use of the microcomputer is integrated throughout the course.

401 Career Development in Agricultural Engineering Fall. 1 credit. Limited to seniors.
Lec, T 12:20. N. R. Scott, L. H. Irwin.
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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $590.
Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.
Dispersion modeling and the effects of pollutants (including oil, outfalls, solid wastes, sludge and dredge spoils, and radioactive wastes) are discussed from the perspectives of elementary physical oceanography and biological processes. Laboratories include basic methods for targeting and tracing 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.

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 Tractors and Power Units for Agriculture Spring. 3 credits. Prerequisite: engineering 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, analysis, and testing of internal

combustion engines and machine components for use in agricultural tractors and other power systems. Study areas also include traction, vehicle dynamics and stability, economics of energy use, and human factors in tractor design.

[**465 Agricultural Processing Systems** Fall. 3 credits. Prerequisite: Agricultural Engineering 250. Not offered 1984–85.
Lecs, T R 11:15; lab, W 2–4:25. R. B. Furry.
Grain drying, flow measurement, and material handling for agricultural engineering applications, with an introduction to dimensional analysis and similitude.]

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 equipment for transporting and modifying food products. Emphasis is on maintaining food quality and conserving energy in systems for processing food.

471 Soil and Water II: Application of Engineering Principles to Soil and Water Problems Spring. 3 credits. Prerequisites: fluid mechanics and Agricultural Engineering 371.
Lec, T R 9:05; lab, F 1:25–4:25. D. S. Durnford.
Application of engineering principles to the analysis and design of irrigation systems and surface and subsurface drainage systems. Elements of open-channel flow, closed-conduit flow, soil-water-plant relationships, on-farm water management, water delivery and distribution systems, pumping, and small-scale hydraulic structures will be included.

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 Fall. 3 credits. Prerequisite: Civil and Environmental Engineering 371.
Lec, T R 9:05; disc-lab, R 2:30–4:40.
K. G. Gebremedhin.
Application of basic structural concepts and procedures to design of agricultural structures. Emphasizes wood structures, including design of trusses, rigid frames, vertical and horizontal diaphragms, prefabricated panels, and columns. Integrated design project.

482 Environmental Control for Animals and Plants Spring. 3 credits. Prerequisite: Agricultural Engineering 250 (or equivalent) and thermodynamics.
Lec, T R 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. Not offered 1984–85.
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. M. F. Walter 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. 4 credits. Prerequisite: electrical systems or permission of instructor.
Lecs, T R 12:20–1:35; 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. Prerequisites: Agricultural Engineering 471, fluid mechanics.
Lecs, M W F 10:10; lab, R 1:25–4:25.
T. S. Steenhuis.
The physics of groundwater flow as related to artificial tile drainage. Critical review of benefits of drainage as well as a thorough analysis of the design of the drainage systems. Laboratories are used to measure physical parameters used in drainage designs.

673 Irrigation Engineering Fall. 3 credits. Prerequisites: Agronomy 200 and Agricultural Engineering 471 or permission of instructor.
Lecs, M W F 10:10. D. S. Durnford.
The physics of water movement into and through the soil as related to the design and analysis of irrigation systems. Computer applications to irrigation scheduling and irrigation systems analyses will be included.

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 lecs, 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. H. Haith.
Development and programming of mathematical models of 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.

682 Building Environment Control Fall. 3 credits. Prerequisite: one course in building environment control and a course in heat transfer. Offered alternate years.
Hours to be arranged. L. D. Albright.
Topics include thermal interactions of animals and plants with their environments, time-dependent thermal modeling of buildings, natural ventilation processes in buildings, sensors and controllers, and psychrometric processes.

685 Biological Engineering Analysis Spring. 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: one introductory course in soil mechanics or highway engineering. Offered alternate years.
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. S-U grades only.
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 7 weeks, M 3:35; 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.
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. K. G. Gebremedhin.
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. 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, D. R. Bouldin, R. B. Bryant, W. J. Cox, B. E. Dethier, W. B. Duke, J. M. Duxbury, G. W. Fick, D. L. Grunes, R. R. Hahn, E. E. Hardy, W. W. Knapp, T. A. LaRue, D. J. Lathwell, A. C. Leopold, D. L. Linscott, M. B. McBride, 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 Seaney, 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, 680, 663, 666, 667, 669, 670, 771, 774

131 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; and hurricanes, thunderstorms, tornadoes, and atmospheric condensation. In the laboratory, emphasis is on techniques of analysis of weather systems.

133 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 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, 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 1:25–4:25. 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.
Lecs, 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. Not offered 1984–85.
Lecs, T R 11:15; lab, R 1:25–4:25; two S all-day field trips will be scheduled during the semester. A. G. Taylor, Geneva Experiment Station. (Ithaca contact, R. L. Obendorf.)
The principles and practices involved in the production, harvesting, processing, storage, testing, quality management, certification, and use of high-quality seed from improved cultivars. Information is applicable to various kinds of agricultural seeds.]

334 Agricultural Meteorology Spring. 3 credits. Limited to 35 students.
T R 10–11:25. Staff.
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 minicomputer data products used in weather forecasting.

360 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 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 Soil Morphology Fall. 1 credit. Recommended for sophomores and juniors. Prerequisite: permission 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 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 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.

372 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 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 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, and vorticity and circulation.

447 Physical Meteorology Fall. 3 credits. Prerequisite: a year each of calculus and physics. Offered alternate years.
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 Synoptic Meteorology I Fall. 4 credits. Prerequisites: 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 computer products derived from the barotropic and baroclinic numerical models. Laboratory work includes surface and upper-air analyses, thickness and vorticity computations, to document macroscale cyclogenesis.

452 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 multiscale storm data to contrast constant pressure and isentropic methods of analysis.

454 Biometeorology Spring. 2 credits. Prerequisite: permission of instructor.
Lec, M 1:25; lab, T 2:30–4:25. D. A. Paine
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_2 increase. Empirical and theoretical models of such interactivity are presented. A systems-level approach to environmental protection decisions is emphasized.

471 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 Organic Soils Fall. 2 credits. Prerequisite: Agronomy 260. Offered alternate years. Not offered 1984–85.
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 Forest Soils Fall. 3 credits. Prerequisite: Agronomy 260 or permission of instructor.
Lecs, T R 8; lab, M or T 1:25–4:25. 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 Soil Microbiology, Lectures Spring. 3 credits. Prerequisite: Agronomy 260 or Microbiology 290. Offered alternate years. Not offered 1984–85.
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. Not offered 1984–85.
Lec, W F 8; disc, W 2:30–4:25. A. Van Wambeke.
Land evaluation in tropical areas and 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 Microbial Ecology Spring. 3 credits. Prerequisite: an elementary course in some facet of microbiology. Offered alternate years.
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 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. Not offered 1984–85.
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. 1 credit. Prerequisite: permission of instructor. S-U grades optional. Offered alternate years.
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. Not offered 1984–85
Lecs, T R 10:10–11:25. 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. Not offered 1984–85.
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. 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 Seed Physiology Spring. 3 credits. Prerequisite: plant physiology.
T R 8:40–9:55. R. L. Obendorf.
Morphology, physiology, and biochemistry of cereal, legume, and oil-seed formation, composition, storage, and germination. Emphasis is on the deposition of seed reserves during seed formation, stabilization of reserves during storage, and mobilization of reserves during germination.

613 Ecology and Physiology of Yield Fall. 3 credits. Prerequisite: plant physiology.
M W F 12:20. T. L. Setter.
A study of the constraints on crop productivity from a physiological perspective. Influence of environment and genetics on the assimilation, translocation, and partitioning of carbon and nitrogen during crop ontogeny. Emphasis on growth processes of vegetative plant organs.

663 Pedology Spring. 3 credits. Prerequisite: Agronomy 361 or consent of instructor. Offered alternate years.
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 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 Soil Physics Fall. 3 credits. Prerequisites: Agronomy 260 and a year of college physics or permission of instructor. Offered alternate years.
M W F 11:15. R. D. Miller.
A study of physical properties and processes in soils, with emphasis on basic principles.

669 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 Soil Chemistry and Mineralogy Fall. 3 credits. Prerequisites: Agronomy 260 and a year of physical chemistry, or permission of instructor. Offered alternate years.
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 Soil Fertility Advanced Course Spring. 3 credits. Prerequisite: graduate status with a major or minor in agronomy. Offered alternate years. Not offered 1984–85.
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 Meteorology Seminar Fall or spring. Prerequisite: permission of instructor.
Hours to be announced. Staff.
Subjects such as weather modification, paleoclimatology, and atmospheric pollution.

829 Master's-Level Thesis Research in Crop Science Fall or spring. Credit by arrangement. Limited to students in the graduate field.
Hours by arrangement.

859 Master's-Level Thesis Research in Meteorology Fall or spring. Credit by arrangement. Limited to students in the graduate field.
Hours by arrangement.

889 Master's-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: J. M Elliot, 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, R. W. Everett, H. N. Erb, R. H. Foote, D. G. Fox, 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, E. J. Pollak, R. L. Quaas, J. B. Russell, S. W. Sabin, H. F. Schryver, R. D. Smith, T. R. Smith, C. J. Sniffen, J. R. Stouffer, M. L. Thonney, D. R. Van Campen, 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. Regenstein, G. L. Rumsey, E. A. Schano, A. van Tienhoven

101 Biology of Domestic Animals Fall. 2 credits. For beginning students. S-U grades optional. Normally taken concurrently with Animal Science 102.
Lecs, W F 9:05. W. B. Currie.
An introduction to the biology of domestic animals in the context of commercial animal production. Required readings, assignments, and demonstrations expose the student to an introductory treatment of the anatomy and physiology of domestic animals. The lectures focus on processes (growth, development, nutrition, locomotion, reproduction, egg production, lactation, etc.) that illustrate the application of the biological material to the science of animal production and use.

102 Introductory Animal Management Fall. 2 credits. For beginning students. S-U grades optional. Normally taken concurrently with Animal Science 101.
Lec, M 9:05; lab T W or R 2–4:25. D. E. Hogue.
An introduction to the livestock industries and animal management. Designed to acquaint the student with dairy and beef cattle, sheep, swine, horses, and poultry, including as much hands-on experience as possible. The feeding, breeding, lactation, growth, and carcass merit of these animals are also considered.

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, or R 10:10–12:20. 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, horses, and poultry.

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.

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, J. Parks.
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. Not offered 1985–86.
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.

332 Poultry Hygiene and Disease (also Veterinary Medicine 255) Fall. 2 credits. The course will be given only if a minimum of 5 students register for the course. Prerequisites: Microbiology 290 and permission of instructor. Letter grades only.
Lec and lab, R 2:05–4:25. M. C. Peckham.
The nature of the infectious and parasitic diseases of poultry and the principles of hygiene applicable to poultry farming for the prevention and control of diseases.

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.

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 of meat animal growth and composition are presented. Principles and techniques of meat animal and carcass grading and 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 case studies 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. Not offered 1984–85.
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 20. 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. 20–24; sec 2, Aug. 27–31. 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: basic 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 farm and laboratory 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, and 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. Prerequisites: Animal Science 112, 220, 221, and 250, or equivalents. Recommended: Agricultural Economics 302.
Lecs, M W F 11:15; lab, M T 1:25–4:25; one unscheduled lab 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.

456 Dairy Management Fellowship Fall and spring. 2 credits. Limited to seniors. Prerequisites: Animal Science 455, Agricultural Economics 302 or equivalent, and permission of instructor. S-U grades only.
Hours to be arranged. D. M. Galton.
The program is designed for undergraduates who have a sincere interest in dairy farm management. Objectives are to gain further understanding of the integration and application of dairy farm management principles and programs with respect to dairymen's objectives and methodology, to expand the concept of team approach in the development and implementation of management programs, and to gain further understanding of the role of research and industry in agriculture. Students are selected during the spring semester of the junior year according to their commitment to dairy farm management in course program and career goals.

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 even-numbered years. Not offered 1984–85.
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; may be repeated for credit. 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. Not offered 1984–85.
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. Offered in even-numbered years. Not offered 1984–85.
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)

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. 233–246.

Communication Arts

N. E. Awa, R. D. Colle, M. deTurck, B. O. Earle, J. S. Foote, C. H. Freeman, D. A. Grossman, J. E. Hardy, R. D. Martin, R. E. Ostman, T. M. Russo, D. F. Schwartz, M. A. Shapiro (on leave), R. E. Shew, P. Stepp, R. B. Thompson, W. B. Ward, S. A. White (on leave spring 1985), A. M. Wilkinson, P. Yarbrough

The numbering of some of the courses in the Department of Communication Arts has been changed. The middle and last digits of course numbers are used to denote specific areas:

00–09	Speech communication
10–19	Interpersonal communication
20–29	Mass communication
30–39	Visual communication and graphic design
40–49	Electronic media
50–59	Journalistic writing
60–66	Professional writing
67–69	Editing
70–79	Communication planning and strategy (advertising and public relations)
80–89	Research methods and interdisciplinary courses
90–94	Special topics and seminars
95–99	Individualized study

Current and Former Course Numbers

Old No.	New No.	Old No.	New No.
114	161	404	416
150	150	410	410
200	116	413	350
—	203	420	354
205	205	421	421
215	120	422	356
230	230	423	423
231	232	440	234
301	201	460	460
302	418	496	496
303	314	497	497
304	204	498	498
311	342	499	499
312	372	601	612
315	250	612	616
316	352	614	665
318	344	620	611
319	346	624	624
331	382	631	680
360	360	632	682
363	363	640	610
365	365	643	626
368	368	650	676
375	375	651	694
376	376	690–691	798
380	380	760	792
401	428	895	899
403	490		

116 (200) Theories of Human Communication Fall, spring, or summer. 3 credits. Not open to first-semester freshmen. S-U grades optional.
Fall: lecs, M W F 12:20. Spring: lecs, M W F 9:05. M. deTurck.
An introduction to human communication from a multidisciplinary perspective. Contributions from philosophy, psychology, neurology, social psychology, linguistics, anthropology, and communication theory are considered.

120 (215) Introduction to Mass Media Fall or spring. 3 credits. S-U grades optional.
Fall: lecs, M W F 9:05. Spring: lecs, M W F 12:20. Staff.
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.

150 Writing for Media Fall or spring. 3 credits. Limited to communication arts majors—freshmen and transfers.
Lec, T 9:05–11; lab, R 9:05–11. J. S. Foote.
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.

[161 (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 1984–85.
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.]

201 (301) Oral Communication Fall, spring, or summer. 3 credits. Each section limited to 24 sophomores, juniors, and seniors. Students missing the first two class meetings without University excuse are dropped so others may register. No student will be added or dropped after the second week of classes. Letter grades only.
Discs, M W F 9:05, 10:10, 11:15, 12:20, 1:25; M F 11:15 and W 12:20; M 12:20 and W F 9:05; M 12:20 and W F 10:10; M F 12:20 and W 1:25; T R 9:05 and W 12:20; T R 10:10 and W 12:20; T R 10:10 and W 1:25; T R 10:10 and W 2:30; T R 11:15 and W 1:25; T R 11:15 and W 2:30; T R 12:20 and W 1:25; T R 12:20 and W 2:30; T R 9:05 and M 12:20; T R 11:15 and M 12:20; M T W 12:20. Evening prelims: fall, Nov. 15; spring, Apr. 11.
R. B. Thompson, T. M. Russo, P. Stepp, and staff.
Through theory and practice the student develops self-confidence and competence in researching, organizing, and presenting material to audiences. Students give four graded speeches, write short papers, perform speaker evaluations, and engage in other speech-related activities.

203 Argumentation and Debate Fall. 3 credits. Prerequisite: Communication Arts 201 (301).
Lec, T R 12:20–1:45. P. Stepp.
The student will learn the principles of argumentation and the rules of debate. Classroom debates on the national topic will provide experience in critical thinking, organization of thoughts quickly, using research, and writing and speaking in a persuasive, logical manner.

204 (304) Effective Listening Fall or spring. 3 credits. Limited to 25 nonfreshman students per section. No students accepted or allowed to drop after the second week of classes. Letter grades only.
Lecs, M W 1:25; lab 1, T 12:20; lab 2, R 12:20; lab 3, T 1:25; lab 4, R 1:25. R. B. Thompson.
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.

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. Staff.
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.

232 (231) Art of Publication Spring. 3 credits. Each lab limited to 30 nonfreshman students. Project materials cost $30–$50.
Lecs, M W 1:25; lab 1, M 2:30–4:25; lab 2, W 2:30–4:25. Staff.
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.

234 (440) Photo Communication Fall or spring. 3 credits. Limited to 25 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.

250 (315) Basic Newswriting for Newspapers Fall or 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 newswriting as it is practiced by newspapers in the United States. Two writing assignments each week, one done in class, one done out of class.

314 (303) Small-Group Communication Fall. 3 credits. Limited to juniors and seniors. Prerequisite: Communication Arts 116 (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.

[342 (311) Radio and Television Communication Fall. 3 credits. Not offered 1984–85.
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.]

344 (318) Radio Writing and Production Fall. 3 credits. Prerequisite: Communication Arts 120 (215) or permission of instructor.
Lec, T R 1:25; lab, T 2:30–4:25. Staff.
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.

346 (319) Television Writing and Production Spring. 3 credits. Limited to 25 students. Prerequisite: Communication Arts 120 (215) or permission of instructor.
Lecs, T R 1:25; lab, T 2:30–4:25. Staff.
Creation of television information programs, from development of idea through research, scripting, and production.

350 (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: T R 11:35–1:10, 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.

352 (316) Science Writing for the Mass Media Fall. 3 credits. No drops after third week. Not open to freshmen. Limited to 18 students.
Lecs, T R 12:20; lab, W 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.

354 (420) Print Media Laboratory Fall. 3 credits. Limited to junior, senior, and graduate communication arts majors. Prerequisite: at least one of Communication Arts 232 (231), 360, or 350 (413).
R 1:25–4:25. J. E. Hardy and staff.
Writing, editing, and layout principles practiced in publishing the *Cornell Countryman*. Some additional outside work sessions may be required.

356 (422) Print Media Laboratory Spring. 3 credits. Limited to junior, senior, and graduate communication arts majors. Prerequisite: Communication Arts 232 (231), 360, or 350 (413).
R 1:25–4:25. J. E. Hardy and staff.
A continuation of Communication Arts 354 (420).

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 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. A. M. Wilkinson and staff.
Students write as members of different organizations, in the position of supervisor, subordinate, colleague, and representative of business, government, community, and other organizations. Emphasis on adapting tone to the audience and the purpose of the message. Weekly writing assignments include various kinds of internal and external reports, memoranda, proposals, and letters. Assignments based on case studies.

365 Writing in the Sciences and Engineering Fall or spring. 3 credits.
Biological sciences section: M W F 9:05; 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 250 (315), 350 (413), 352 (316), or 365.
W F 10:10–11:25. J. E. Hardy.
Students will follow the process that takes a manuscript from final draft to page proof. Emphasis will be on copy editing, proofreading, fitting copy, working with authors, making editorial decisions, and developing skill in critical reading. Appropriate for any student who expects to work with manuscripts or do editorial work.

372 (312) Advertising and Promotion Fall, spring, or summer. 3 credits. The fall M W lecture is limited to junior and senior communication arts majors and graduate students. The fall T R lecture and the spring lecture is for juniors, seniors, and graduate students *not* majoring in communication arts. S-U grades optional.
Fall: Lec 1, Communication Arts majors *only*, M W 2:30–4:25, R. Earle; lec 2, T R 11:15–12:10; sec 1, T 12:20–1:15, sec 2, R 12:20–1:15, C. Whittle. Spring: lec, M W 2:30–3:35; sec 1, M 3:35–4:25, sec 2, M 3:35–4:25, sec 3, W 3:35–4:25, sec 4, W 3:35–4:25, R. Earle.
For majors the course emphasizes the planning, creation, production, and measuring of advertisements and advertising campaigns. Lectures and workshops alternate. The sections for nonmajors emphasize 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 and discussion sections.

375 Principles of Public Communication Fall. 3 credits. Limited to juniors and seniors, or permission of instructor.
M W F 1:25. Staff.
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 and staff.
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.

382 (331) Survey Research Methods Fall or spring. 3 credits. Limited to 20 junior, senior, or graduate majors; others by permission of instructor. Prerequisites: Communication Arts 116 (200) or 120 (215) or permission of instructor.
Fall T R 10:10–11:25, J. P. Yarbrough; spring: M W F 9:05, 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.

410 Organizational Communication Fall. 3 credits. Labs limited to 20 junior, senior, or graduate communication arts students; others by permission. Prerequisite: Communication Arts 116 (200) or equivalent.
Lecs, M W 9:05; lab 1, F 9:05–11, lab 2, R 2:30–4:25. M. deTurck, D. F. Schwartz.
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 analyzed in lab.

416 (404) Psychology of Communication Spring. 3 credits. Prerequisite: Communication Arts 116 (200) or permission of instructor.
T R 10:10–11:25. N. Awa.
An advanced multidisciplinary study of communication theory. Topics include personal interaction, channels of communication, and effectiveness of messages. Study includes intensive analysis of major communication theorists.

418 (302) Persuasion Spring. 3 credits
Prerequisite: Communication Arts 116 (200).
Lecs, M W F 11:15. M. deTurck.
The course concentrates on the analysis and understanding of the persuasion events around us. The assignments stress the application of various theories of persuasion to the interpersonal communication process. Students should have basic understanding of interpersonal communication theory.

[421 Broadcast Media Laboratory Fall. 2 credits. Limited to junior and senior communication arts majors. Prerequisite: Communication Arts 344 (318) or 346 (319). Not offered 1984–85.
Emphasis on production of television and radio programs for various audiences. Course work is done primarily through individual tutorial arrangement.]

[423 Broadcast Media Laboratory Spring. 2 credits. Not offered 1984–85.
Hours to be arranged.
A continuation of Communication Arts 421.]

428 (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.

[460 Video Communication Fall, spring, or summer. 3 credits. Limited to 15 seniors or graduate students. Prerequisites: Communication Arts 116 (200), 230, and permission of instructor by application. Not offered fall 1984; may be offered spring 1985.
Lec, M 12:20–2:15; lab, M 2:30–4:25. Staff.
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.]

[490 (403) Special Topics 3 credits; may be repeated for credit. Prerequisite: Permission of instructor. Not offered 1984–85.
Topics in communication, determined by the interest of the faculty members and students, are discussed.]

496 Internship Fall, spring, or summer. 1–6 credits. Students must apply to department internship committee no later than the spring pre-course enrollment period for a fall internship, or the fall pre-course enrollment period for a spring or summer internship. Prerequisites: communication arts junior or senior, 3.0 average in communication arts courses, and approval of committee.
J. S. Foote 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. 1–3 credits, variable; may be repeated to 6 credits with a different supervising faculty member. Prerequisite: 3.0 cumulative average. 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, variable; may be repeated to 6 credits. Limited to juniors and seniors. Intended for undergraduates desiring classroom teaching experience. Prerequisite: 3.0 cumulative average (2.5 if teaching assistant for a skill development course) and permission of the faculty member who will supervise the work and assign the grade. Students must use the faculty member's section number to register.
Hours to be arranged. Staff.
Periodic meetings with the instructor cover realization of course objectives, evaluation of teaching methods, and student feedback. In addition to aiding with the actual instruction, each student prepares a paper on some aspect of the course.

499 Independent Research Fall or spring. 1–3 credits, variable; may be repeated to 6 credits. Limited to senior and graduate students. Prerequisite: 3.0 cumulative average. 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.

610 (640) Seminar in Organizational Communication Spring. 3 credits. Open to seniors by permission.
T R 8:30–9:55. D. F. Schwartz.
Study of interpersonal communication systems in organizations. Methods for analyzing organizational and human communication effectiveness, including communication audits and network analysis.

611 (620) Communication in Organizations Fall. 3 credits. Prerequisite: Communication Arts 610 (640) or 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.

612 (601) Intercultural and Development Communication Spring. 3 credits.
T R 1:25–2:45. 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 ethnolingustic and cross-cultural studies.

[616 (612) Seminar: Interpersonal Communication Fall. 3 credits. Not offered 1984–85.
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.]

624 Communication in the Developing Nations Fall. 3 credits. Limited to seniors and graduate students.
F 11:15–1:45. R. D. Colle.
An examination of existing communication patterns and systems and their contributions to the development process. Attention is given to the interaction between communication development and national development in primarily agrarian societies.

626 (643) Impact of Communication Technologies Spring. 3 credits.
T R 3–4:25. 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.

665 (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, and preparation of tables and illustrations; and on advanced and special problems in organization, paragraph development, sentence structure, and usage.

676 (650) Advanced Communication Seminar Spring. 3 credits. Primarily for graduate students but open to seniors.
M W 10:10–12. R. D. Colle and staff.
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.

680 (631) Studies in Communication Fall. 3 credits. Limited to graduate students in communication arts; others by permission of instructor.
T R 10:10–12. 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.

682 (632) Methods of Communication Research Fall. 3 credits. Limited to graduate students.
M W 10:10–12. R. E. Ostman, J. P. Yarbrough.
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.

694 (651) Seminar: Communication Issues Fall and spring. No credit. S-U grades only.
Alternate F 2:30. Fall: R. E. Ostman, R. D. Colle; spring: R. E. Ostman and staff.
A departmental seminar for students and faculty on contemporary issues in communication.

792 (760) Advanced Communication Studies 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.

798 (690–691) Communication Teaching Laboratory Fall and spring. 1–3 credits each semester. May be repeated once. Limited to graduate students. Prerequisite: permission of the faculty member who will supervise the work and assign the grade. Students must use the faculty member's section number to register.
Graduate faculty.
Designed primarily for graduate students who want experience in teaching communication courses. Students work with an instructor in developing course objectives and philosophy, planning, and teaching.

899 (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, D. Deshler, W. E. Drake, D. Drinkwater, J. A. Dunn, J. R. Egner, R. B. Fischer, R. N. Fougnier, H. A. Geiselmann, 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 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 and 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 11:15, F hours to be arranged; 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.

312 Learning to Learn Spring. 3 credits. Prerequisite: one or more courses in psychology or educational psychology.
T R 9:05. J. D. Novak.
This course is intended for persons interested in the improvement of their learning strategies and the application of new ideas and methods to improve educational programs. Lectures and discussions are based on assigned readings and the contributions of class members. The major focus of the course is how and why concepts play a central role in human learning. Concept mapping and other strategies for educating will be use.

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 Agricultural and Extension Education Spring. 3 credits.
Lec, M 2–4:30; lab to be arranged. W. E. Drake.
The course is intended for persons interested in careers as professional educators in agriculture. Careers included are secondary school and two-year college teachers, cooperative extension agents, and educators in agriculture business and industry. The course emphasizes career information, methodology, and introductory teaching experiences. Class activities include presentations by resource persons currently in teaching and extension careers, field trips, and microteaching experiences.

335 Youth Organizations Spring. 3 credits. Prerequisite: introductory psychology or permission of instructor.
Lec, 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 1984–85.
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. It 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: Education 352 or concurrent registration in 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, parents, and teacher rights; and educational politics. Issues are treated from legal, sociological, and economic perspectives.

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 and 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; lab, M or 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.

413 Psychology of Human Interaction Fall. 3 credits. Enrollment limited. Prerequisite: permission of instructor. Fee, $5.
T R 10:10–12:05. D. E. Hedlund.
Designed to develop skills for, and understanding of, effective interpersonal communication and interaction. 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 on, 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. Prerequisites: Education 331 and concurrent registration in Education 430 and 434
M T W R F 8–3. 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. Staff.
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 644 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 the use of microcomputers as an aid to instruction-communication. Students select modules A, B and/or C. Module A focuses on literacy development and includes learning BASIC as a program language. Equipment selection, software evaluation, CMI, CAI, and software package (word processing, data base management, accounting, spread sheet, and others) applicable to instruction are presented in module B. Students select special projects for module C. Modules A and B utilize a hands-on instructional approach.

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.

478 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.

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.

482 Introduction to Adult Education (also Human Service Studies 411) Fall. 3 credits. Limited to 45 students. S-U grades optional.
T R 10:10–12:05. D. Deshler.
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.

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 lab 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 T W 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. Not offered 1984–85
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 and puzzles. Acquaintance with curricula and other teaching resources, geometrical constructions, problem solving, and 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, mathematics, 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 611, or permission of instructor.
T R 9:05. J. D. Novak.
Presents a coherent theory of education combining concepts from philosophy, psychology of learning, curriculum, and instruction. New educational methods, including concept mapping and clinical interviews, will be presented. Students will gain competence by applying concepts and methods in a project related to their interests. Classes include discussion of student-initiated questions and use of videotape to analyze educational techniques.

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. 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 8–10. 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 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 611, concurrent registration in Education 611, 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. 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 of their own.

[654 Evaluation for Program Management Spring. 1–3 credits. S-U grades optional. Not offered 1984–85.
M 2:30–5. R. L. Bruce.
The course will consist of three modules, each for one hour of 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.

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, and 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. Prerequisite: work in philosophy and permission of instructor. S-U grades optional.
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. Not offered 1984–85.
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.]

[678 Planning Educational Systems Spring. 3 credits. S-U grades optional. Not offered 1984–85.
R 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.
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. For students who have interest or experience in education or development programs where community is an important concern.
W 2:30–5. Staff.
An examination of the concept of community; changes in community life; the analysis of community; alternative strategies for community development; patterns of response to community by universities, colleges, schools, cooperative extension, and government service agencies; and such functional dimensions of community-education programming as participatory decision making, volunteers, leadership development, council formation and function, interagency coordination, and change-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; and educational psychology for developing countries or 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; and 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.

715 Seminar in Psychology and Education Fall or spring. Variable credit. Prerequisite: permission of instructor. S-U grades only.
W 1:25–3:30. D. E. Hedlund.
Selected topics focusing on the interaction of theoretical and research developments in psychology and education.

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 from theory and research are applied to the study and practice of adult and continuing education. Appropriate for graduate students in educational psychology, extension and continuing education, community service education, and others interested in adult learning and development.

730 Seminar in Agricultural and Occupational Education Spring. 2 credits. S-U grades optional.
R 10:10. A. Berkey, 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. Not offered 1984–85.
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 445–644 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 the 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. For students who have interest or experience in international rural development or community development. Not offered 1984–85.
J. L. Compton.

An exploration of the social psychological aspects of socioeconomic development, focusing on 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-biomechanical technology, communication-diffusion of innovations, and development education.]

[783 Comparative Extension Education Systems Spring. 3 credits. Prerequisite: Education 782 or permission of instructor. Not offered 1984–85.
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, 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, 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. Pecksarsky, 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

Emeritus professors: C. O. Berg, J. E. Dewey, J. G. Franclemont, C. E. Palm, R. L. Patton, L. L. Pechuman, W. A. Rawlins, E. H. Smith, R. G. Young

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.
J. K. Liebherr.
Introduces the science of entomology by focusing on basic principles of systematics, morphology, physiology, behavior, and ecology of insects. The laboratory in early fall includes field trips to collect and study insects in the natural environment. A (small) collection 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. Not offered 1984–85.
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.
Q. D. Wheeler
An introduction to the classification, evolutionary history, and distribution of the insects. Laboratory practice in the identification of orders, families, and representative genera of insects; methods of collection, preservation, and study. Lectures on theory and practice of insect systematics and major features of insect evolution. Insect collections are required.

332 Systematics Discussion Group Spring. 1 credit. Prerequisite: concurrent enrollment in Entomology 331 or permission of instructor. S-U grades only. Offered alternate years.
Disc, hours to be arranged. Q. D. Wheeler.
Readings and discussion on topics in systematics coordinated with the lecture series in Entomology 331.

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. Not offered 1984–85.
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 current topics in pest management, with an emphasis on insect pest management.

443 Pathology and Entomology of Trees and Shrubs (also Plant Pathology 443) Fall. 5 credits. Prerequisites: 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: 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.
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. Not offered 1984–85.
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 261 and Entomology 212 or their equivalents. Recommended: concurrent enrollment in Biological Sciences 457. Offered alternate years. Not offered 1984–85.
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. Not offered 1984–85.
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 Freshwater Invertebrate Ecology and Systematics Spring. 4 credits. Prerequisite: Entomology 212. Recommmended: Biological Sciences 360–462–464.
Lecs, T R 9:05; labs, M W or T R 1:25–4:25.
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. Not offered 1984–85.
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 W 10:10; labs, M W 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. Not offered 1984–85.
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.
Lecs, W 10:10; labs, F 1:25–4:25, second lab to be arranged. 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.
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. Not offered 1984–85.
Hours to be arranged. G. C. Eickwort, M. J. Tauber.]

664 Insect-Plant Interactions Seminar Spring. 2 credits. Limited to 15 students. Prerequisites: entomology, ecology, evolution, organic chemistry, and written permission of instructor. S-U grades optional. Offered alternate years.
One evening a week, to be arranged. P. P. Feeny.
For graduate students and seniors. Presentations and discussions by students on the evolution of patterns of interaction between plants and insects, emphasizing critical evaluation of concepts and evidence.

672 Seminar in Aquatic Ecology Spring. 1 credit. Prerequisites: permission of instructor and either Entomology 471 or Biological Sciences 462, 464. Offered alternate years.
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; disc-labs, M W 2–4:25. Staff (Q. D. Wheeler, coordinator).
An introduction to modern theory and methods of systematic biology. Lectures, readings, and discussions on theoretical systematics, including species concepts, classification, phylogenetics, and biogeography. Laboratories include modern methods of finding characters and various methods of analysis of data (e.g., cladistic hand and computer methods, numerical methods). Part of the grade is based on a final paper.

677 Biological Control Fall. 3 credits. Prerequisites: Entomology 212, Biological Sciences 360, and permission of instructor. Offered alternate years.
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 parasitoids 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. Not offered 1984–85
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. Bing, A. M. Elliot, C. C. Fischer, R. T. Fox, G. L. Good, N. W. Hummel, Jr., 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, R. T. Trancik, P. J. Trowbridge

Courses by Subject

Commercial floriculture crop production: 424, 425
Freehand drawing and illustration: 109, 111, 210, 211, 214, 316, 417
Horticultural physiology: 401, 402, 601
Introductory courses: 100, 105
Landscape architecture (professionally accredited program): see pp. 60–61.
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.
Lecs, M W 8; lab, T or W 2–4:25. Faculty.
An introduction to the fields of floriculture, landscape horticulture, and related horticultural fields and professions.

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.

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; studios, T 9:05–11, R 1:25–4.
Spring: permission of instructor required (lecture and all studio hours must be scheduled). Lec, T or W 10:10, plus 5 additional studio hours to be scheduled in two- or three-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, and form vs. value drawing. Weekly outside sketchbook assignments.

210 Architectural Sketching in Watercolor Summer. 3 credits. S-U grades optional.
M T W R F 11:30–12:45. R. J. Lambert.
Practice in outdoor architectural sketching, primarily in watercolor but including pen and ink, pencil, and colored pencil. Studio will develop working sketches into complete renderings. Principles of perspective are taught and applied. For any student who wishes to develop skill in handling watercolor. Outside-of-class sketchbook work required.

211 Freehand Drawing and Illustration Fall. 2 credits. Prerequisite: Floriculture 111 or equivalent. S-U grades optional.
6 studio hours scheduled in two- or three-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.

213 Woody Plant Materials Spring. 4 credits. Fee for lecture-laboratory manual, $20.
Lecs, T R 9:05; lab, T 2–4:25 and W or F 2–4:25. R. G. Mower.
A study of the trees, shrubs, ground covers, and vines used in landscape plantings. Emphasis is on winter identification and values for use as landscape material.

214 Watercolor Spring. 2 credits. Prerequisite: Floriculture 111 or equivalent. S-U grades optional.
6 studio hours scheduled in two- or three-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.

312 Garden and Interior Plants I Fall. 3 credits. Fee for lecture-laboratory manual, $20.
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. Fee for lecture-laboratory manual, $20.
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.

314 Turfgrass Management Fall. 3 credits. Prerequisites: Agronomy 200. Recommended: Biological Sciences 242 and 244 or permission of instructor. One T field trip required. Cost of supplies, $10.
Lecs, T R 9:05; lab, T 11:15–1:10. A. M. Petrovic.
A study of 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.

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.

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. Fee for lecture-laboratory manual, $20.
Lecs, M W 11:15; lab, M 2–4:25. 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 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.

401 Principles of Plant Propagation Fall. 3 credits. Prerequisite: Biological Sciences 242 and 244 or other course in plant physiology. A field trip fee will be charged.
Lecs, T R 8; lab, R 1:25–4:25 (except field trips lasting until 6:30 p.m.). K. W. Mudge.
Propagation of plants using vegetative techniques including cuttage, graftage, tissue culture, and propagation from seed. Physiological, environmental, and anatomical principles are stressed rather than hands-on techniques. Examples include horticultural, agronomic, and forestry crops.

402 Physiology of Horticultural Plants Spring. 4 credits. Prerequisite: Biological Sciences 242 and 244, 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.

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.

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. Field trips are made to commercial nurseries.

424 Principles of Florist Crop Production Spring. 4 credits. Limited to 40 students. Preference given to juniors. Prerequisites: Floriculture 401 and Biological Sciences 242 and 244, or 342 (may be taken concurrently), or equivalent; or permission of instructor. Cost for field trip and special laboratory supplies, $25.
Lecs, M W F 9:05; lab, R 2–4:25. Faculty.

A study of commercial production of florist crops, with 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 are taken.
R. W. Langhans.
Intended to provide the latest information on efficient operation and administration of a commercial greenhouse, outside the sphere of production methods for specific crops. Consideration is given to the industry, centers of production, competition, location, types of structures, heating, ventilation, cooling, fertilizing, watering systems, and business analysis and management.

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. 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. S-U grades optional.
C. F. Gortzig and faculty.
Study of topics under investigation by the department or of special interest to the student.

501–502 Master of Professional Studies (Agriculture) Project Fall and spring. 1–6 credits.
Hours to be arranged. Graduate faculty.
A comprehensive project emphasizing the application of floricultural and ornamental horticultural principles and practices to professional horticultural teaching and to extension and research programs and situations. Required of Masters of Professional Studies (Agriculture) candidates in the Field.

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.

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. 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 501 or permission of instructor. Cost of supplies, about $30.
Lecs, T R 9:05–11. P. J. Trowbridge.
Basic skills in graphic presentation, including the use of media and line drawing techniques applicable to presentations for landscape architecture projects. Plan graphics, orthographic projections, isometric drawing, including sections, elevations, and lettering, are covered in the course.

206 Graphic Communication II Spring. 3 credits. Prerequisite: Landscape Architecture 205.
Lecs, T R 1:25–3:30. R. T. Trancik.
A continuation of Landscape Architecture 205, which introduces students to more advanced skills development in three-dimensional drawing, including perspective construction, rendering, value delineation, and color.

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 are applied to shaping the outdoor spatial environment. Students are introduced to spatial design vocabularies for a variety of environmental scales and types.

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. 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. 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 Process Spring. 6 credits. Lab fee, $20; cost of drafting supplies, about $100.
Lecs, M W F 1:25; studio, M W F 2:30–4:25.
T. H. Johnson, L. Mirin.
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 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. 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, and construction administration

403 Studio: Advanced Site Design Fall, weeks 8–14. 3 credits. 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. 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.
L. Mirin.

501 Studio: Design Fundamentals Fall. 6 credits. Limited to landscape architecture majors. Lab fee, $20; cost of basic drafing 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. 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 drafing 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. Mirin.

***521 History of Landscape Architecture I** Fall. 3 credits.
L. Mirin.

***522 History of Landscape Architecture II** Spring. 3 credits.
L. Mirin.

[*530 Urban Landscape Planning and Design Spring. 3 credits. Not offered 1984–85.
L. Mirin.]

531 Regional Landscape Planning I Fall. 4 credits. Prerequisite: permission of instructor.
Lecs, M W F 10:10, additional hour to be arranged.
A. S. Lieberman.
Landscape-ecology as a basis for regional landscape planning. 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 to provide a base for understanding the utilization of landscape ecological knowledge in the planning process. The course is directed to graduate students in landscape architecture, architecture, city and regional planning, ecology, international studies, international agriculture and rural development, and natural resources.

[532 Regional Landscape Planning II Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1984–85.
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.]

*Offered through the College of Architecture, Art, and Planning

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.
Lecs, M W F 1:25; studios, M W F 2:30–4:25.
Required five-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 Process 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, L. Mirin.
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, and construction administration.

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. 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. It 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. Mirin.

690 Independent Reading and Research Spring. 1–3 credits. S-U grades optional.
A. S. Lieberman.
Independent reading and research in landscape ecology and regional landscape planning.

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, J. Brady, 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, P. M. Walsh, 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. 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 and staff.
This interdisciplinary course describes various causes of postharvest food losses in developing countries and methods available to reduce the losses. Designed for all students in agriculture. Emphasis on unprocessed and minimally processed foods such as cereal grains, fresh fruits, and vegetables. 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, R. B. Gravani.
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. Not offered 1984–85.
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 and 321 and Microbiology 290 and 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 1984–85.
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 1984–85.
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 1984–85.
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.]

[406 Food Processing Fermentations Lectures Fall. 3 credits. Prerequisite: background in microbiology. Offered alternate years. Not offered 1984–85.
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. Not offered 1984–85.
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.
Lecs, T R 11:15; lab, W 1:25–4:25. D. C. Graham.
To acquaint students with important fungi, from the standpoint of their beneficial as well as their harmful effects in food production, preservation, and spoilage. Laboratories deal with morphology, 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 1984–85.
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 12:20–4:25. 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, R 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 the chemical technology of fat processing.

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 hands-on experiments.

496 Extension, Research, and Teaching Methods in Food Science Fall. 2 credits.
F 1:25–4:25. D. K. Bandler, J. M. Regenstein.
A series of lectures, demonstrations, and practical exercises to improve basic communication skills in extension, research, and teaching in food science. The course will deal specifically with presenting scientific data in oral, visual, and written form as well as research design and thesis preparation.

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 instructor. Prerequisite: Food Science 409 or its equivalent. Not offered 1984–85.
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. Not offered 1984–85.
Lecs, T R 10:10. 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. Limited to 16 students. Prerequisites: organic chemistry, biochemistry, knowledge of dairy-product manufacturing procedures, and permission of instructor. Offered alternate years.
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, M 1:25–3:20 and 4 hours per week to be arranged. 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. After the introduction, students will schedule laboratory time at their convenience.

607 Advanced Food Microbiology Spring 3 credits.
T R 10:10–11:30. P. M. Walsh.
Selected topics with emphasis on the genetics of dairy starter cultures, yeasts, microbial toxins, and spores. Special attention is given to the relationship and importance to food systems.

[608 Food Color and Food Pigments Fall. 1 credit. Prerequisite: organic chemistry. Offered alternate years. Not offered 1984–85.
Lec, F 11:15. J. P. VanBuren.
A survery 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. Not offered 1984–85.
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. Not offered 1984–85.
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 1984–85.
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.
Lec, F 9:05. 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.
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.

402 Agriculture in Tropical America Fall. 2 credits. Prerequisite: upperclass or graduate standing. Letter grades only.
F 1:25–3:20. Staff.
A preparatory course for participation in International Agriculture 602. Physical resources, vegetation, history, crop and animal production, and various social and economic aspects of agriculture in tropical America will be discussed.

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 Agriculture in the Developing Nations Spring. 3 credits. Prerequisites: International Agriculture 402 and permission of instructors. Cost of field-study trip, estimated at $350 for lodging, meals, and personal expenses.
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 Management NBA 588) Spring. 3 credits. S-U grades optional.
T 2:30–5:30. 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 Fall. 2 credits. S-U grades optional. Not offered 1984–85.
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.]

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

Political Economy of Ideology and Development in Africa (Africana Studies and Research Center 400)

Political Theory, Planning, and Development in Africa (Africana Studies and Research Center 500)

Economics of Agricultural Geography (Agricultural Economics 150)

Agricultural Trade Policy (Agricultural Economics 430)

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 1984–85.]

Microeconomic Issues in Agricultural Development (Agricultural Economics 664)

[Seminar on Latin American Agricultural Policy (Agricultural Economics 665) Not offered 1984–85.]

Seminar in Agricultural Development (Agricultural Economics 666)

Seminar on Agricultural Trade Policy (Agricultural Economics 730)

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) Not offered 1984–85.]

Livestock Production in Warm Climates (Animal Science 400)

[Forages of the Tropics for Livestock Production (Animal Science 403) Not offered 1984–85]

Southeast Asia Seminar: The Philippines (Asian Studies 602)

Seminar in Science and Technology Policy in Developing Nations (City and Regional Planning 771)

Seminar in Policy Planning in Developing Nations: Technology Transfer and Adaption (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) Not offered 1984–85]

[Comparative Extension Education (Education 783) Not offered 1984–85]

Postharvest Food Systems (Food Science 247)

International Food Sciences and Development (Food Science 403)

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)

International Environmental Issues (Natural Resources 400)

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 Agriculture (Plant Pathology 655)

[Economic Fruits of the World (Pomology 208) Not offered 1984–85.]

Rural Sociology and Agrarian Problems (Rural Sociology 105)

Social Indicators and Data Management in Poor Countries (Rural Sociology 213)

Rural Development and Cultural Change (Rural Sociology 355)

Subsistence Agriculture in Transition (Rural Sociology 357)

Rural Social Stratification (Rural Sociology 445)

Health and Socioeconomic Development (Rural Sociology 462)

Contemporary Sociological Theories of Development (Rural Sociology 606)

[Social Organization of Agriculture (Rural Sociology 650) Not offered 1984–85]

[Rural Development Information Systems (Rural Sociology 715) Not offered 1984–85]

Social Movements in Agrarian Society (Rural Sociology 723)

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. 60–61.

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 exams: spring, Feb. 21, March 21, Apr. 25. 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 or spring, 2 credits. Summer, 3 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. 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.
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. Credit 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. Staff.
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.
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. Not offered 1984–85
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. Not offered 1984–85.
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. Staff.
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.

694 Bacterial Diversity Fall 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 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.

792 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) Not offered 1984–85.]

Advanced Soil Microbiology (Agronomy 606)

Microbial Genetics, Lectures (Biological Sciences 485)

Microbial Genetics, Laboratory (Biological Sciences 486)

Microbial Engineering (Chemical Engineering 644)

Insect Pathology (Entomology 453)

Food Microbiology Lectures (Food Science 394)

Food Microbiology Laboratory (Food Science 395)

Food Mycology (Food Science 411)

Advanced Food Microbiology Lectures (Food Science 607)

Basic Immunology, Lectures (Veterinary Medicine 315 and Biological Sciences 305)

Basic Immunology, Laboratory (Veterinary Medicine 316 and 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 and 291, or permission of instructor. Recommended: Veterinary Medicine 315 and 316.
Lec, T R 1:05; lab, T R 2:05–4:25. G. M. Dunny, R. V. Pollack, L. Winter.
This is a course in medical microbiology. Bacteria, fungi, and viruses that cause diseases, and their interactions with the infected host, are described in lecture. Laboratory sessions emphasize the isolation, culture, and identification of pathogenic microbes and demonstration of the infectious process in experimental animals.

Advanced Immunology, Lectures (Veterinary Medicine 705)

Advanced Immunology, Laboratory (Veterinary Medicine 706)

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.
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, J. W. Gillett, S. P. Gloss, R. A. Howard, T. L. Hullar, J. W. Kelley, C. C. Krueger, 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

120 Agriculture and Wildlife Spring. 3 credits.
Lecs, M W F 11:15. J. W. Caslick.
A survey course for students in any year or major. Interactions between agriculture and wildlife in North America since 1800. Emphasis on agricultural impacts on wildlife, wildlife impacts on agricultural productivity and wildlife damage control, and policies and programs of agencies and other organizations that influence wildlife on agricultural lands.

200 Principles of Conservation Fall. 3 credits. Limited to students specializing in natural resources. Not open to students who have passed Natural Resources 201.
Lecs, M W F 10:10; 1-hour disc to be arranged. R. T. Oglesby.
The nature of natural resources, how they are managed, and their interactions with individuals and societies are considered. Case histories and demonstrations will be used to illustrate both principles and practices. Emphasis will be on management of renewable resources based on an ecological perspective.

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. T J. Fahey.
A survey course intended for students in any year and major. Designed to provide information and to stimulate ideas as an aid to understanding the major environmental problems facing spaceship Earth. A topical approach with representative case histories is taken. Topics include global changes (CO_2, ozone, and climate); population growth and the world food problem; energy resources and alternatives; mineral resources and recycling; land use in urban and rural landscapes; air, water, and soil pollution; and endangered species and wildlands.

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, weeks 1–5. 1 credit.
Lec, 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, weeks 6–10. 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, weeks 11–15. 1 credit. Prerequisite: Natural Resources 210 or permission of instructor.
Lec, M W F 8. Field trip, all day on one S. J. P. Lassoie.
Appreciation of forests as a natural resource. Importance of ecology and measurement as bases for forest management. Introduction to tree biology and silviculture.

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 hundred-tap 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.

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. Laboratory project is designed to provide experience in the development of resource inventories.

400 International Environmental Issues Spring. 3 credits. Limited to 30 students.
Lecs, M W F 12:20–1:10. R. J. McNeil.
International aspects of environmental and natural resources preservation and development. Concepts, e.g., development, resource ownership, exploitation, compensation, and preservation. Cultural differences in attitudes and behavior towards environment. Management practices under different cultural, economic, and social systems. Current issues, e.g., acid precipitation; management of migratory whales, fish, and waterfowl; Antarctic development; global energy issues; and preservation of fragile and endangered resources. Lecture and discussion; term paper; exams.

[406 Conducting Marine and Natural Resources Extension Programs Spring. 3 credits. Offered alternate years. Not offered 1984–85.
Lec and rec, T 10:10, R 1:30–3:30. 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 how the humanities, especially religion, philosophy, and ethics, affect our understanding and treatment of nature. Historical overview followed by consideration of selected themes, including progress, the meaning of the term *nature,* play and work, 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 Spring. 3 credits. Prerequisite: general biology.
M W F 9:05. A. N. Moen.
In-depth analyses of the ecological basis for decision making in wildlife management, with further considerations of sociological, economic, and legal factors within both historical and future time frames.

[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. Not offered 1984–85.
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 Sciences" 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. Not offered 1984–85.
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. C. C. Krueger.
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. Usually offered alternate years. Offered 1985–86.
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; 1 or more weekend field trips.
C. C. Krueger.
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 an ongoing college fishery-research program is provided.

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, 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, C. C. Krueger, 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. Staff.
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 ecotope 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 specializing in natural resources conservation.

606 Marine Resources Policies Spring. 2 credits. Prerequisite: at least one related course such as Biological Sciences 364, 666, or 668, or 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.

607 Ecotoxicology Spring. 3 credits. Prerequisites: Graduate or senior status and Biological Sciences 468 or two 300-level courses in chemistry, biochemistry, or toxicology.
Lecs, M W F 11:15; disc to be arranged.
J. W. Gillett.
Lectures, readings, and special guests focus on the principles of effects of toxic chemicals on natural ecosystems, their components, and processes. Major topics include fate and transport of chemicals (chemodynamics), comparative biochemical toxicology, ecosystem process analysis, simulation through mathematical and physical (microcosm) models, and relationships to regulation and environmental management.

609 Effects of Ecological Perturbations on Fishes 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 Values Fall. 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 in late September. 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. T. A. Gavin.
Discussion of individual research or current problems in wildlife science.

700 Ecotoxicologic Methods Fall. 4 credits. Prerequisites: Natural Resources 607 or permission of instructor.
Lab, M W F 1:25–4:25; lec-disc, M 12:25–1:15.
J. W. Gillett.
Laboratory and field problems in bioassay, instrumental analysis, and field techniques demonstrate aspects of data quality control and assurance, interpretation, and utility in ecotoxicologic assessment. Standardization and test protocol development are emphasized. Work covers material from all media and microbiota, terrestrial and aquatic vertebrates, invertebrates, and plants.

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)

Environmental Biology (Agriculture and Life Sciences 695)

Resource Economics (Agricultural Economics 250, 350, 450)

Image Analysis I: Landforms (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)

Managing the Aquatic Environment (Toxicology 304)

Ecology and Management of Disturbed Aquatic Systems (Toxicology 605)

Effects of Ecological Perturbations on Fishes (Toxicology 609)

Plant Breeding

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. Seaney, 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 fine 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 anther 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.

402 Plant Tissue Culture Laboratory Spring. 2 credits. Prerequisite: Plant Breeding 401 (may be taken concurrently) *and* permission of instructor.
W 1:25–4:25 plus 1 hour to be arranged.
E. D. Earle.
Laboratory exercises complementing Plant Breeding 401. Techniques for establishing, evaluating, and utilizing plant organ, embryo, callus, cell, protoplast, and anther cultures will be covered. Experiments will use a broad range of plant materials.

603 Methods of Plant Breeding Spring. 3 credits. Prerequisites: Biological Sciences 101–102; Biological Sciences 281 or Plant Breeding 225 or equivalent; and field crops, vegetable crops, floriculture, or pomology.
M W F 11:15. W. R. Coffman.
Breeding methods, systems, and operational procedures for producing commercial crop varieties are considered in detail, with emphasis on an integrated, interdisciplinary approach to major breeding objectives, including agronomic characteristics, quality characteristics, disease resistance, insect resistance, drought and flood tolerance, adverse soil tolerance, and adverse temperature tolerance.

604 Methods of Plant Breeding Laboratory Fall. 2 credits. Prerequisites: Plant Breeding 603 or equivalent.
T R 1:25–4:15. R. E. Anderson.
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. Involves several field trips to both public and private breeding programs.

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, lecs, 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.

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. Not offered 1984–85.
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.
T R 8:30–10. 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, weeks 1–7. 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 1:25–4:25 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; and chemical and biological control.

309 Introductory Mycology Fall. 4 credits. Prerequisites: a year of botany or equivalent and permission of instructor.
Lecs, T R 1:25–2:15; labs, T R 2:30–4:25, and an additional two-hour period to be arranged individually for each student. J. W. Lorbeer.
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: Plant Pathology 301 and Entomology 241 or equivalents.
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.
Nomenclature of fungi, lichens, and mycetozoans.

650 Diseases of Vegetable Crops Fall.
J. W. Lorbeer, P. A. Arneson, R. E. Wilkinson, T. A. Zitter.

651 Diseases of Fruit Crops For graduate students and advanced undergraduates with a particular interest in fruit. Autotutorial slide and tape sets.
P. A. Arneson.
Covers the economic importance, causal agents, symptoms, disease cycle, and control measures for the major diseases of fruit in the Northeast.

652 Field Crop Pathology
G. C. Bergstrom.

653 Dendropathology
G. W. Hudler, W. A. Sinclair.

654 Diseases of Florist Crops
R. K. Horst.

655 Plant Diseases in Tropical Agriculture
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 301 and 309, or equivalent with permission of instructor.
Lec, T R 11:15; lab, T R 1:25–4:25. S. V. Beer, M. B. Harrison, M. Zaitlin, 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, P. Palukaitis.
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. Not offered 1984–85.
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.
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 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 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. 3 credits. Prerequisites: Plant Pathology 309 or equivalent, genetics, plant or animal taxonomy, and permission of instructor. Offered alternate years.
Lec, M 10:10; labs, M W 1:25–4:25; required field trips. R. P. Korf.
Emphasis is on the principles of taxonomy, and 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, A. N. Lakso, F. W. Liu, R. M. Pool, L. E. Powell, W. C. Stiles

100 Introductory Pomology Fall or spring. 3 credits. S-U grades only for graduate students.
Fall: lecs, T R 8; lab, M or W 2–4:25 (1984), T or W 2–4:25 (1985). Spring: lecs, T R 8; lab, T or R 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. Not offered 1984–85; next offered 1985–86.
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. Not offered 1984–85; next offered 1985–86
Lecs, M W 9:05; lab, W 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, M 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 (1984), M 1:25–4:25 (1985). 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. Not offered 1984–85; next offered 1985–86.
Lecs, M W 9:05; lab, W 2–4:25. Staff.

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. Not offered 1984–85; next offered 1985–86.
Lecs, T R 9:05; lab, R 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.
Lecs, T R 9:05; lab, T 2–4:25 (1984), R 2–4:25 (1986). 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.
Lecs, T R 9:05; lab, T 1:25–4:25 (1984), R 2–4:25 (1986). 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 4¼ weeks. 1 credit. Prerequisite: Pomology 100 or permission of instructor. S-U grades optional. Not offered 1984–85; next offered 1986–87.
Lecs, T R 9:05; lab, R 2–4:25. Staff.
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.

[602 Effective Horticultural Research Spring. 2 credits. Undergraduates admitted by permission of instructor. S-U grades optional. Offered alternate years. Not offered 1984–85; next offered 1985–86.
Hours to be arranged. A. N. Lakso.
Methods of problem solving in research will be examined, with emphasis on horticultural problems. Invited faculty and administrators will lead discussions on selected topics. Each student will be required to prepare a term paper and make an oral presentation on a grant proposal related to horticulture.]

[604 Growth and Development of Woody Plants Spring. 2 credits. Prerequisite: introductory plant physiology. Offered alternate years. Not offered 1984–85; next offered 1985–86.
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 are 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 members 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, M. Lancelle, J. C. Preston, B. M. Scott, F. W. Young

Note: Students seeking to fulfill their group C requirements may do so through several equivalent courses: Rural Sociology 100, 101, and 105 and Sociology 101. Rural Sociology 101 and Sociology 101 have identical content.

100 Human Societies: Ecological and Sociocultural Prespectives. Spring. 3 credits. S-U grades optional.
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 interactive relationships between the bioecological 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.

101 Introduction to Sociology Fall. 3 credits.
Lecs, T R 10:10; disc, M 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30 and F 10:10, 11:15, 12:20, or 1:25. (See also Sociology 101 for alternative times.)
C. C. Geisler and staff.
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, and 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.

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 Agrarian 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; and social movements and social control.

175 Issues in Contemporary American Indian Societies Spring; summer, 6-week session. 3 credits.
Spring: M W F 11:15. R. Fougnier.
American Indian people are confronted with a myriad of special circumstances that impinge upon their everyday lives. The purpose of this course is to present background to these issues and give perspective from an American Indian point of view. Early history and the postcontact period will be reviewed with an emphasis given to 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.
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, inquality, 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: Power and World Views (also Anthropology 242) Fall. 3 credits. Enrollment limited to 20 students. Prerequisite: ALS 100, Anthropology 230, or permission of instructor.
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 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.

243 American Indian Philosophies II: Native Voices (also Anthropology 243) Spring. 3 credits. Enrollment limited to 20 students. Prerequisite: ALS 100, Anthropology 230, or permission of instructor.
T R 2:30–3:45. S. Saraydar.
An exploration of the diverse expressions of philosophy to be found in the words of American Indians. Novels, political treatises, speeches, autobiographies, and other sources reflecting Indian attitudes on a variety of subjects will be examined for beauty and power of expression as well as to identify recurring themes.

[324 Social Organization and the Environment Spring. 3 credits. Not offered 1984–85.
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 in the context of cultural milieux.

356 Rural Society in America Fall. 3 credits. S-U grades optional.
M W F 9:05. H. Capener.
A new awareness and image of rural America is examined. The population turnaround in the recent decades is evidence of new significance assigned to physical space, quality of life, and an environment protected for the future. From sociological and historical perspectives the natural technological changes in American rural society are examined as a prelude to exploring future changes that might be expected for agriculture, the environment, and rural society.

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.

[367 American Indian Tribal Governments (also Anthropology 367) Fall. 3 credits. Not offered 1984–85.
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 H. R. Capener, departmental honors committee representative.

401 Intermediate Sociological Theory (also Sociology 401) Fall. 4 credits. S-U grades optional.
T R 10–12:05. P. R. 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.

[405 Agriculture, Society, and Biotechnology (also Biology and Society 408) Spring. 3 credits. Prerequisites: two courses in the social sciences and three courses in the biological or agricultural sciences. Not offered 1984–85.
W 1:25–4:25. F. H. Buttel.
An examination of socioeconomic aspects of biotechnology in the context of historical patterns of technological change in agriculture in developed and developing countries. The major topics covered include the social organization of biotechnology research, industry-university relationships, and the potential socioeconomic impacts of biotechnology on agriculture.]

[432 Community Development Fall. 3 credits. Not offered 1984–85.
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. Not offered 1984–85.
M 12:20–2:15. P. R. 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 10–11:15. 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 Spring. 3 credits.
T 7–10. C. Geisler.
The seminar defines social-impact and 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.

[442 American Indian Philosophies: Selected Topics (also Anthropology 442) Spring. 4 credits. Prerequisite: Rural Sociology or Anthropology 242 or 243 and permission of instructor. Not offered 1984–85.
W 7:30–9:25 p.m.; additional sessions to be arranged. S. Saraydar.
This course provides an opportunity for students to pursue topics of interest from American Indian Philosophies I and II in greater depth. The specific topics to be investigated will be selected by the students in consultation with the instructor prior to the beginning of the semester.]

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; and 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.

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.
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.
T R 1:25–3:30; 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. Course concludes with an introduction to factor analysis.

619 Research Design II Spring. 4 credits. Prerequisite: an introductory methods course and a statistics course.
T R 1:25–3:30; lab to be arranged. J. D. Francis.
The second part of the sequence in introductory 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. Special emphasis is given to use of categorical variables in regression. Students are expected to use actual data to familiarize themselves with data handling and processing.

[621 Environmental Sociology Spring. 3 credits. Not offered 1984–85.
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.
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 instructor. S-U grades optional. Not offered 1984–85.
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. Not offered 1984–85.
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.
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 Spring 4 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. Readings focus on the peasant economy literature. 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. Not offered 1984–85.
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 1984–85.
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. Not offered 1984–85.
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 middle third of the course deals with recursive and nonrecursive path models. Time series analysis is the last topic discussed.]

[721 Ecological Perspectives on Social Change Spring. 3 credits. Not offered 1984–85.
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.
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 Changing Property Institutions Spring. 3 credits.
W 7–10 p.m. 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. Not offered 1984–85.
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 1984–85.
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. 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: R, weeks 4, 8, 13. Staff.
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., weeks 5 and 10. Staff.
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: weeks 5 and 10. 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, weeks 1–7. 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. Oct. 4. Final: 7–8:30 p.m. Oct. 25. S. R. Searle.
Definitions, basic operations and arithmetic, determinants, and the inverse matrix. Emphasis is on understanding basic ideas.

417 Matrix Algebra II Fall, weeks 8–14. 2 credits. Prerequisite: Statistics 416 or permission of 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. 15. Final during University exam week. S. R. Searle.
Rank, linear dependence, canonical forms, linear equations, generalized inverses, and 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 and 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 12:20 or 1:25; 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. Prelims: 7 p.m. Feb. 21 and March 28. 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.

603 Statistical Methods III Spring. 3 credits. Prerequisite: Statistics and Biometry 601 and corequisite Statistics and Biometry 602 or permission of instructor.
Lecs, T R 12:10–1:45; disc, hours to be arranged. Staff.
Sample surveys and questionnaire design; statistical aspects of survival analysis, life tables, and statistical design of clinical trials; categorical data analysis, including logistic regression, loglinear models combining contingency tables, and application to case control studies; bioassay; multivariate analysis, and space-time clustering.

[605 Applied Regression Analysis Fall 1 credit. Prerequisite: Statistics 409 and 602. Not offered 1984–85.
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.
T R 1:25–2:45. D. S. Robson.
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. Not offered 1984–85.
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; and goodness-of-fit.]

662 Mathematical Ecology (also Biological Sciences 662) Spring. 3 credits. Prerequisites: a year of calculus and a course in statistics. Offered in alternate years.
M W F. C. E. McCulloch, S. A. Levin.
Mathematical and statistical analysis of populations and communities: theory and methods. Spatial and temporal pattern analysis, deterministic and stochastic models of population dynamics. Model formulation, parameter estimation, and simulation and analytical techniques.

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. Offered alternate years. Not offered 1984–85.
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; and bioavailability.]

[713 Experimental Design Fall. 4 credits. Prerequisites: Statistics 416 and 602 or equivalent. Offered alternate years. Not offered 1984–85.
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.
W. T. Federer.

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. Offered alternate years. Not offered 1984–85.
Introduction to multinormal 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; R. R. Bellinder, L. Ellerbrock, J. R. Hicks, D. Lisk, P. M. Ludford, P. L. Minotti, M. A. Mutschler, J. Sieczka, L. D. Topoleski, D. H. Wallace, H. C. Wien, D. A. Wilcox

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 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. H. C. Wien, P. L. Minotti.
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 1984–85.
Lab, W F 2–4:25. Staff.
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.
Lecs, M W 8; disc, F 8. P. L. Minotti.
The manner in which plants affect the growth of other plants is examined with primary 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.

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 1984–85.
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 1984–85.
T R 9:05–11. Staff.
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)
Adleman, Marvin I., M.L.A., Harvard U. Prof., Floriculture and Ornamental Horticulture
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., Horticultural Sciences (Geneva)
Aldwinckle, Herbert S., Ph.D., U. of London (England). Prof., Plant Pathology (Geneva)
Alexander, Martin, Ph.D., U. of Wisconsin. Liberty Hyde Bailey Professor of Soil Science, Agronomy
Allee, David J., Ph.D., Cornell U. Prof., Agricultural Economics
Anderson, Bruce L., Ph.D., U. of California at Berkeley. Assoc. Prof., Agricultural Economics
Anderson, Ronald E., Ph.D., U. of Wisconsin. Assoc. Prof., Plant Breeding and Biometry
Apgar, Barbara J., Ph.D., Cornell U. Asst. Prof., Animal Science
Aplin, Richard D., Ph.D., Cornell U. Prof., Agricultural Economics
Arneson, Phil A., Ph.D., U. of Wisconsin. Assoc. Prof., Plant Pathology
Austic, Richard E., Ph.D., U. of California at Davis. 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
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
Beer, Steven V., Ph.D., U. of California at Davis. Assoc. Prof., Plant Pathology
Beermann, Donald H., Ph.D., U. of Wisconsin. Assoc. Prof., Animal Science
Bellinder, Robin R., Ph.D., Virginia Polytechnic Inst. and State U. Asst. Prof., Vegetable Crops
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
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)
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
Brady, John W., Jr., Ph.D., SUNY at Stonybrook. Asst. Prof., Food Science
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., LL.B., Cornell U. Prof., Agricultural Economics
Burr, Thomas J., Ph.D., U. of California at Berkeley. Assoc. 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. Assoc. 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
Cox, William J., Ph.D., Oregon State U. Asst. Prof., Agronomy
Creasy, Leroy L., Ph.D., U. of California at Davis. Prof., Pomology
Cummins, James N., Ph.D., Southern Illinois U. Prof., Horticultural Sciences (Geneva)
Cunningham, Danis L., Ph.D., Virginia Polytechnic Inst. Assoc. 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
Day, Lee M., Ph.D., U. of Minnesota. Prof., Agricultural Economics
Dethier, Bernard E., Ph.D., Johns Hopkins U. Prof., Agronomy
deTurck, Mark A., Ph.D., Michigan State U. Asst. Prof., Communication Arts
Dickey, Robert S., Ph.D., U. of California at Berkeley. Prof., Plant Pathology
Dickson, Michael H., Ph.D., Michigan State U. Prof., Horticultural Sciences (Geneva)
Dietert, Rodney R., Ph.D., U. of Texas at Austin. Assoc. 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., Horticultural Sciences (Geneva)
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
Elliot, John M., Ph.D., Cornell U. Prof., Animal Science
Erickson, Eugene C., Ph D., Michigan State U. Prof., Rural Sociology
Everett, Robert W., Ph.D., Michigan State U. Prof., Animal Science
Ewing, Elmer E., Ph.D., Cornell U. Prof., Vegetable Crops
Fahey, Timothy J., Ph.D., U. of Wyoming. Asst. Prof., Natural Resources
Federer, Walter T., Ph.D., Iowa State U. Liberty Hyde Bailey Professor of Biological Statistics, Plant Breeding and Biometry
Fick, Gary W., Ph.D., U. of California at Davis. Assoc. Prof., Agronomy
Fiori, Bart J., Ph.D., Cornell U. Assoc. Prof., Entomology (Geneva)
Fischer, Charles C., M.S., Michigan State U. Assoc. Prof., Floriculture and Ornamental Horticulture
Fischer, Richard B., Ph.D., Cornell U. Prof., Education
Foote, Robert H., Ph D., Cornell U. Jacob Gould Schurman Professor, Animal Science
Forker, Olan D., Ph.D., U. of California at Berkeley. Prof., Agricultural Economics
Forshey, Chester G., Ph D., Ohio State U. Prof., Pomology and Viticulture (Geneva)
Fox, Danny G., Ph D., Ohio State U. Assoc. Prof., Animal Science
Fox, Raymond T., Ph D., Cornell U. Prof., Floriculture and Ornamental Horticulture
Francis, Joe D., Ph D., U. of Missouri. Assoc. Prof., Rural Sociology
Freebairn, Donald K., Ph.D., Cornell U. Assoc. Prof., Agricultural Economics
Fry, William E., Ph.D., Cornell U. Prof., Plant Pathology
Furry, Ronald B., Ph.D., Iowa State U. Prof., Agricultural Engineering
Galton, David M., Ph.D., Ohio State U. Asst. Prof., Animal Science
Garrett, Patricia, Ph.D., U. of Wisconsin. Asst. Prof., Rural Sociology
Gavin, Thomas A., Ph.D., Oregon State U. Asst. Prof., Natural Resources
Gebremedhin, Kifle G., Ph.D., U. of Wisconsin. Asst. Prof., Agricultural Engineering
Geiselmann, Harrison A., Ph.D., Cornell U. Prof., Education
Geisler, Charles C., Ph.D., U. of Wisconsin. Asst. Prof., Rural Sociology
German, Gene A., Ph.D., Cornell U. Assoc. Prof., Agricultural Economics
Ghiorse, William C., Ph.D., Rensselaer Polytechnic Inst. Assoc. Prof., Microbiology
Gillett, James W., Ph.D., U. of California at Berkeley. Prof., Natural Resources
Gloss, Steven P., Ph D., U. of New Mexico. Asst. Prof., Natural Resources
Gonsalves, Dennis, Ph.D., U. of California at Davis. Assoc. Prof., Plant Pathology (Geneva)
Good, George L., Ph.D., Cornell U. Prof., Floriculture and Ornamental Horticulture
Goodrich, Dana C., Ph.D., Cornell U. Prof., Agricultural Economics
Gorewit, Ronald C., Ph.D., Michigan State U. Assoc. Prof., Animal Science
Gortzig, Carl F., Ph.D., Michigan State U. Prof., Floriculture and Ornamental Horticulture
Gowin, D. Bob, Ph.D., Yale U. Prof., Education
Gracen, Vernon E., Jr., Ph.D., U. of Florida. Prof., Plant Breeding and Biometry
Graham, Donald C., Ph.D., Cornell U. Assoc. Prof., Food Science
Gravani, Robert B., Ph.D., Cornell U. Assoc. Prof., Food Science
Greenberg, E. Peter, Ph.D., U. of Massachusetts. Assoc. Prof., Microbiology
Gregory, Peter, Ph.D., Kings Coll. Assoc. Prof., Plant Breeding and Biometry
Grunes, David L., Ph.D., U. of California at Berkeley. Prof., Agronomy
Guest, Richard W., M.S., North Dakota Coll. Prof., Agricultural Engineering
Gunkel, Wesley W., Ph.D., Michigan State U. Prof., Agricultural Engineering
Gyrisco, George G., Ph.D., Cornell U. Prof., Entomology
Hagedorn, Henry H., Ph.D., U. of California at Davis. Assoc. Prof., Entomology
Haith, Douglas A., Ph.D., Cornell U. Prof., Agricultural Engineering
Hall, Lana L., Ph.D., U. of California at Berkeley. Assoc. Prof., Agricultural Economics
Haller, Emil J., Ph.D., U. of Chicago. Prof., Education
Hang, Yong D., Ph.D., McGill U. (Canada). Assoc. Prof., Food Science and Technology (Geneva)
Harman, Gary E., Ph.D., Oregon State U. Prof., Horticultural Sciences (Geneva)
Harrison, Martin B., Ph.D., Cornell U. Assoc. Prof., Plant Pathology
Hedlund, Dalva E., Ph.D., Colorado State U. Assoc. Prof., Education

Hicks, James R., Ph.D., U. of Maryland. Assoc. Prof., Vegetable Crops
Hintz, Harold F., Ph.D., Cornell U. Prof., Animal Science
Hoch, Harvey, Ph.D., U. of Wisconsin. Assoc. Prof., Plant Pathology
Hogue, Douglas E., Ph.D., Cornell U. Prof., Animal Science
Hood, Lamartine F., Ph.D., Penn State U. Prof., Food Science
Horst, R. Kenneth, Ph.D., Ohio U. Prof., Plant Pathology
Hotchkiss, Joseph H., Ph.D., Oregon State U. Asst. Prof., Food Science
How, Richard B., Ph.D., Cornell U. Prof., Agricultural Economics
Hrazdina, Geza, Ph.D., Eidg. Technische Hochschule at Zürich (Switzerland). Prof., Food Science and Technology (Geneva)
Hudler, George W., Ph.D., Colorado State U. Asst. Prof., Plant Pathology
Hummel, Norman W., Ph.D., Pennsylvania State U. Asst. Prof., Floriculture and Ornamental Horticulture
Hunter, James E., Ph.D., U. of New Hampshire. Prof., Plant Pathology (Geneva)
Irish, Wilmot W., M.S., U. of Illinois. Prof., Agricultural Engineering
Irwin, Lynne H., Ph.D., Texas A & M U. Assoc. Prof., Agricultural Engineering
Jewell, William J., Ph.D., Stanford U. Prof., Agricultural Engineering
Jewett, Donald L., M.S., Michigan State U. Assoc. Prof., Cooperative Extension
Johnson, Katherine M., Ph.D., U. of Minnesota. Asst. Prof., Food Science and Technology (Geneva)
Johnson, Thomas H., M.L.A., Harvard U. Assoc. Prof., Floriculture and Ornamental Horticulture
Johnson, Warren T., Ph.D., U. of Maryland. Prof., Entomology
Jones, Edward D., Ph.D., U. of Wisconsin. Prof., Plant Pathology
Jordan, William K., Ph.D., Cornell U. Prof., Food Science
Kalter, Robert J., Ph.D., U. of Wisconsin. Prof., Agricultural Economics
Kelley, John W., Ph.D., Cornell U. Assoc. Prof., Natural Resources
Keshavarz, Kavous, Ph.D., U. of Georgia. Asst. Prof., Poultry and Avian Sciences
Khan, Anwar A., Ph.D., U. of Chicago. Prof., Horticultural Sciences (Geneva)
Kinsella, John E., Ph.D., Penn State U. Libery Hyde Bailey Professor of Food Science, Food Science
Knapp, Warren W., Ph.D., U. of Wisconsin. Assoc. Prof., Agronomy
Knoblauch, Wayne A., Ph.D., Michigan State U. Assoc. Prof., Agricultural Economics
Korf, Richard P., Ph.D., Cornell U. Prof., Plant Pathology
Kosikowski, Frank V., Ph.D., Cornell U. Prof., Food Science
Kramer, John P., Ph.D., U. of Illinois. Prof., Entomology
Krueger, Charles C., Ph.D., U. of Minnesota. Asst. Prof., Natural Resources
Kubota, Joe, Ph.D., U. of Wisconsin. Prof., Agronomy
LaDue, Eddy L., Ph.D., Michigan State U. Assoc. Prof., Agricultural Economics
Lakso, Alan N., Ph.D., U. of California at Davis. Prof., Horticultural Sciences (Geneva)
Lamb, Robert C., Ph.D., U. of Michigan. Prof., Horticultural Sciences (Geneva)
Lambert, Robert J., Jr., M.S., U. of Michigan. Prof., Floriculture and Ornamental Horticulture
Lancelle, Mark A., Ph.D., Pennsylvania State U. Asst. Prof., Rural Sociology
Langhans, Robert W., Ph.D., Cornell U. Prof., Floriculture and Ornamental Horticulture
Lassoie, James P., Ph.D., U. of Washington. Assoc Prof., Natural Resources
Lathwell, Douglas J., Ph.D., Ohio State U. Prof., Agronomy
Lazarus, William F., Ph.D., U. of Illinois. Asst. Prof., Agricultural Economics
Ledford, Richard A., Ph.D., Cornell U. Prof., Food Science
Lee, Chang Y., Ph.D., Utah State U. Prof., Food Science and Technology (Geneva)
Lee, David R., Ph.D., U. of Wisconsin. Asst. Prof., Agricultural Economics
Lesser, William H., Ph.D., U. of Wisconsin. Assoc. Prof., Agricultural Economics
Lieberman, Arthur S., M.S., Cornell U. Prof., Floriculture and Ornamental Horticulture
Liebherr, James K., Ph.D., U. of California at Berkeley. Asst. Prof., Entomology
Linscott, Dean L., Ph.D., U. of Nebraska. Prof., Agronomy
Lisk, Donald J., Ph.D., Cornell U. Prof., Vegetable Crops
Liu, Frank W., Ph.D., Cornell U. Assoc. Prof., Pomology
Loehr, Raymond C., Ph.D., U. of Wisconsin. Liberty Hyde Bailey Professor of Agricultural Engineering
Lorbeer, James W., Ph.D., U. of California at Berkeley. Prof., Plant Pathology
Loria, Rosemary, M.S., Michigan State U., Asst. Prof., Plant Pathology
Lucey, Robert F., Ph.D., Michigan State U. Prof., Agronomy
Ludford, Pamela M., Ph.D., Cornell U. Assoc. Prof., Vegetable Crops
Ludington, David C., Ph.D., Purdue U. Prof., Agricultural Engineering
McBride, Murray B., Ph.D., Michigan State U. Assoc. Prof., Agronomy
McCormick, Charles C., Ph.D., North Carolina State U. Asst. Prof., Poultry and Avian Sciences
McCrimmon, Donald A., Ph.D., North Carolina State U. Asst. Prof., Natural Resources
McCulloch, Charles E., Ph.D., Cornell U. Asst. Prof., Plant Breeding and Biometry
McDowell, Robert E., Ph.D., U. of Maryland. Prof., Animal Science
McLaughlin, Edward W., Ph.D., Michigan State U. Asst. Prof., Agricultural Economics
McLellan, Mark R., Ph.D., Michigan State U. Asst. Prof., Food Science and Technology (Geneva)
McNeil, Richard J., Ph.D., U. of Michigan. Assoc. Prof., Natural Resources
Malecki, Richard A., Ph.D., U. of Missouri. Asst. Prof., Natural Resources
Marsh, James A., Ph.D., Northwestern U. Asst. Prof., Poultry and Avian Sciences
Marx, Gerald A., Ph.D., U. of Wisconsin. Prof., Horticultural Sciences (Geneva)
Massey, Louis M., Jr., Ph.D., Cornell U. Prof., Food Science and Technology (Geneva)
Mattick, Leonard R., Ph.D., U. of Connecticut. Prof., Food Science and Technology (Geneva)
Merrill, William G., Ph.D., Cornell U. Prof., Animal Science
Metz, Joseph F., Jr., Ph.D., Cornell U. Prof., Agricultural Economics
Millar, Roy L., Ph.D., Cornell U. Prof., Plant Pathology
Miller, Dennis D., Ph.D., Cornell U. Assoc. Prof., Food Science
Miller, Robert D., Ph.D., Cornell U. Prof., Agronomy
Millier, William F., Ph.D., Cornell U. Prof., Agricultural Engineering
Milligan, Robert A., Ph.D., U. of California at Davis. Assoc. Prof., Agricultural Economics
Millman, Jason, Ph.D., U. of Michigan. Prof., Education
Minotti, Peter L., Ph.D., North Carolina State U. Assoc. Prof., Vegetable Crops
Moen, Aaron N., Ph.D., U. of Minnesota. Prof., Natural Resources
Monk, David H., Ph.D., U. of Chicago. Asst. Prof., Education
Morse, Roger A., Ph.D., Cornell U. Prof., Entomology
Mortlock, Robert P., Ph.D., U. of Illinois. Prof., Microbiology
Mount, Timothy D., Ph.D., U. of California at Berkeley. Prof., Agricultural Economics
Mower, Robert G., Ph.D., Cornell U. Prof., Floriculture and Ornamental Horticulture
Mudge, Kenneth W., Ph.D., Washington State U. Asst. Prof., Floriculture and Ornamental Horticulture
Muka, Arthur A., Ph.D., Cornell U. Prof., Entomology
Mutschler, Martha A., Ph.D., U. of Wisconsin. Asst. Prof., Plant Breeding and Biometry
Negm, Fayek B., Ph.D., U. of California at Riverside. Asst. Prof., Floriculture and Ornamental Horticulture
Noble, Lucinda A., Ph.D., U. of North Carolina. Prof., Extension
Novak, Joseph D., Ph.D., U. of Minnesota. Prof., Education
Novakovic, Andrew M., Ph.D., Purdue U. Asst. Prof., Agricultural Economics
Obendorf, Ralph L., Ph.D., U. of California at Davis. Prof., Agronomy
Oberly, Gene H., Ph.D., Michigan State U. Prof., Pomology
Oglesby, Ray T., Ph.D., U. of North Carolina. Prof., Natural Resources
Olson, Gerald W., Ph.D., U. of Wisconsin. Assoc. Prof., Agronomy
Oltenacu, Elizabeth A., Ph.D., U. of Minnesota. Asst. Prof., Animal Science
Oltenacu, Pascal A., Ph.D., U. of Minnesota. Assoc. Prof., Animal Science
Ostman, Ronald E., Ph.D., U. of Minnesota. Assoc. Prof., Communication Arts
Oyer, Edwin B., Ph.D., Purdue U. Prof., Vegetable Crops
Paine, Douglas A., Ph.D., SUNY at Albany. Assoc. Prof., Agronomy
Pardee, William D., Ph.D., Cornell U. Prof., Plant Breeding and Biometry
Pearson, Roger C., Ph.D., U. of California at Davis. Assoc. Prof., Plant Pathology (Geneva)
Peck, Nathan H., Ph.D., Cornell U. Prof., Horticultural Sciences (Geneva)
Peckarsky, Barbara L., Ph.D., U. of Wisconsin. Asst. Prof., Entomology
Petrovic, A. Martin, Ph.D., Michigan State U. Asst. Prof., Floriculture and Ornamental Horticulture
Peverly, John H., Ph.D., U. of Illinois. Assoc. Prof., Agronomy
Philipson, Warren, Ph.D., Cornell U. Assoc. Prof., Agronomy
Pimentel, David, Ph.D., Cornell U. Prof., Entomology
Pitt, Ronald E., Ph.D., Cornell U. Asst. Prof., Agricultural Engineering
Plaisted, Robert L., Ph.D., Iowa State U. Prof., Plant Breeding and Biometry
Poleman, Thomas T., Ph.D., Stanford U. Prof., Agricultural Economics
Pollak, E. John, Ph.D., Iowa State U. Assoc. Prof., Animal Science
Pool, Robert M., Ph.D., Cornell U. Assoc. Prof., Horticultural Sciences (Geneva)
Posner, George J., Ed.D., SUNY at Albany. Assoc. Prof., Education
Potter, Norman N., Ph.D., Iowa State U. Prof., Food Science
Powell, Loyd E., Jr., Ph.D., Cornell U. Prof., Pomology
Preston, James C., Ed.D., Cornell U. Assoc. Prof., Rural Sociology
Provvidenti, Rosario, D.Sc., Palermo U. (Italy). Prof., Plant Pathology (Geneva)
Quaas, Richard L., Ph.D., Colorado State U. Assoc. Prof., Animal Science
Raffensperger, Edgar M., Ph.D., U. of Wisconsin. Prof., Entomology
Ranney, Christine K., Ph.D., U. of California at Davis. Asst. Prof., Agricultural Economics
Rao, M. Anandha, Ph.D., Ohio State U. Assoc. Prof., Food Science and Technology (Geneva)
Regenstein, Joe M., Ph.D., Brandeis U. Assoc. Prof., Poultry and Avian Sciences
Rehkugler, Gerald E., Ph.D., Iowa State U. Prof., Agricultural Engineering
Reid, W. Shaw, Ph.D., Michigan State U. Prof., Agronomy
Reisch, Bruce, Ph.D., U. of Wisconsin. Asst. Prof., Pomology and Viticulture (Geneva)
Reissig, William H., Ph.D., Oregon State U. Assoc. Prof., Entomology (Geneva)
Richmond, Milo E., Ph.D., U. of Missouri. Assoc. Prof., Natural Resources
Riedl, Helmut, Ph.D., Michigan State U. Assoc. Prof., Entomology (Geneva)
Riha, Susan, Ph.D., Washington State U. Charles Lathrop Pack Professor, Asst. Prof., Agronomy
Ripple, Richard E., Ph.D., U. of Wisconsin. Prof., Education

Rizvi, Syed S., Ph D., Ohio State. Assoc. Prof., Food Science
Robinson, Kenneth L., Ph.D., Harvard U. Liberty Hyde Bailey Professor of Agricultural Economics, Agricultural Economics
Robinson, Richard W., Ph D., Cornell U. Prof., Horticultural Sciences (Geneva)
Robson, Douglas S., Ph.D., Cornell U. Prof., Plant Breeding and Biometry
Rochow, William F., Ph.D., Cornell U. Prof., Plant Pathology
Rockcastle, Verne N., Ph.D., Cornell U. Prof., Education
Roelofs, Wendell L., Ph.D., Indiana U. Liberty Hyde Bailey Professor of Insect Biochemistry, Entomology (Geneva)
Rosenberger, David A., Ph.D., Michigan State U. Assoc. Prof., Plant Pathology (Geneva)
Russell, James B., Ph.D., U. of Illinois. Asst. Prof., Animal Science
Rutz, Donald A., Ph D., North Carolina State U. Asst. Prof., Entomology
Sabin, Samuel W., Ph.D., Oregon State U. Prof., Animal Science
Sanford, John C., Ph.D., U. of Wisconsin. Asst. Prof., Horticultural Sciences (Geneva)
Sawyer, Alan J., Ph.D., Michigan State U. Asst. Prof., Entomology
Schaefers, George A., Ph.D., U. of California at Berkeley. Prof., Entomology (Geneva)
Schano, Edward A., M.S., Michigan State U. Prof., Poultry and Avian Sciences
Schryver, Herbert F., Ph.D., U. of Pennsylvania. Assoc. Prof., Animal Science
Schwager, Steven J., Ph.D., Yale U. Asst. Prof., Plant Breeding and Biometry
Schwartz, Donald F., Ph.D., Michigan State U. Prof., Communication Arts
Scott, Norman R., Ph.D., Cornell U. Prof., Agricultural Engineering
Scott, Thomas W., Ph.D., Michigan State U. Prof., Agronomy
Seaney, Robert R., Ph D., Cornell U. Prof., Agronomy
Searle, Shayle R., Ph.D., Cornell U. Prof., Plant Breeding and Biometry
Seem, Robert C., Ph.D., Penn State U. Assoc. Prof., Plant Pathology (Geneva)
Semel, Maurie, Ph.D., Cornell U. Assoc. Prof., Entomology
Setter, Timothy L., Ph.D., U. of Minnesota. Asst. Prof., Agronomy
Shallenberger, Robert S., Ph.D., Cornell U. Prof., Food Science and Technology (Geneva)
Shannon, Stanton, Ph.D., U. of California at Davis. Assoc. Prof., Horticultural Sciences (Geneva)
Shelton, Anthony M., Ph.D., U. of California at Riverside. Asst. Prof., Entomology (Geneva)
Sherbon, John W., Ph D., U. of Minnesota. Prof., Food Science
Shipe, W. Frank, Ph.D., Cornell U. Prof., Food Science
Sieczka, Joseph B., M.S., Cornell U. Assoc. Prof., Vegetable Crops
Sinclair, Wayne A., Ph.D., Cornell U. Prof., Plant Pathology
Sisler, Daniel G., Ph.D., Cornell U. Prof., Agricultural Economics
Smiley, Richard W., Ph.D., Washington State U. Assoc. Prof., Plant Pathology
Smith, Charles R., Ph.D., Cornell U. Asst. Prof., Natural Resources
Smith, R. David, Ph.D., Cornell U. Assoc. Prof., Animal Science
Smith, Terry R., Ph.D., Michigan State U. Asst. Prof., Animal Science
Sniffen, Charles J., Ph.D., U. of Kentucky. Assoc. Prof., Animal Science
Snyder, Victor, Ph.D., Cornell U. Asst. Prof., Agronomy
Soderlund, David M., Ph.D., U. of California at Berkeley. Assoc. Prof., Entomology (Geneva)
Sorrells, Mark E., Ph.D., U. of Wisconsin. Assoc. Prof., Plant Breeding and Biometry
Spencer, James W., Ph.D., Stanford U. Prof., Agricultural Engineering
Splittstoesser, Don F., Ph.D., U. of Wisconsin. Prof., Food Science and Technology (Geneva)
Stamer, John R., Ph D., Cornell U. Prof., Food Science and Technology (Geneva)
Stanton, Bernard F., Ph.D., U. of Minnesota. Prof., Agricultural Economics
Steenhuis, Tammo S., Ph D., U. of Wisconsin. Assoc. Prof., Agricultural Engineering
Steinkraus, Keith H., Ph.D., Iowa State U. Prof., Food Science and Technology (Geneva)
Steponkus, Peter L., Ph.D., Purdue U. Prof., Agronomy
Stiles, Warren C., Ph.D., Pennsylvania State U. Assoc. Prof., Pomology
Stoewsand, Gilbert S., Ph.D., Cornell U. Prof., Food Science and Technology (Geneva)
Stouffer, James R., Ph.D., U. of Illinois. Prof., Animal Science
Straub, Richard W., Ph.D., U. of Missouri. Assoc. Prof., Entomology (Geneva)
Strike, Kenneth A., Ph D., Northwestern U. Prof., Education
Sutphin, H. Dean, Ph.D., Ohio State U. Asst. Prof., Education
Szkolnik, Michael, Ph D., Rutgers U. Prof., Plant Pathology (Geneva)
Tauber, Maurice J., Ph.D., U. of California at Berkeley. Prof., Entomology
Tauer, Loren W., Ph.D., Iowa State U. Asst. Prof., Agricultural Economics
Taylor, Alan G., Ph.D., Oklahoma State U. Asst. Prof., Horticultural Sciences (Geneva)
Tenney, Richard W., Ph.D., Penn State U. Asst. Prof., Education
Thonney, Michael L., Ph.D., U. of Minnesota. Assoc. Prof., Animal Science
Thurston, H. David, Ph.D., U. of Minnesota. Prof., Plant Pathology
Timmons, Michael B., Ph.D., Cornell U. Asst. Prof., Agricultural Engineering
Tingey, Ward M., Ph D., U. of Arizona. Assoc. Prof., Entomology
Tomek, William G., Ph.D., U. of Minnesota. Prof., Agricultural Economics
Topoleski, Leonard D., Ph.D., Purdue U. Prof., Vegetable Crops
Trancik, Roger T., M.L.A., Harvard U. Asst. Prof., Floriculture and Ornamental Horticulture
Trowbridge, Peter J., M.L.A., Harvard U. Assoc. Prof., Floriculture and Ornamental Horticulture
VanBuren, Jerome P., Ph.D., Cornell U. Prof., Food Science and Technology (Geneva)
VanCampen, Darrell R., Ph.D., North Carolina State U. Assoc. Prof., Animal Science
VanDemark, Paul J., Ph.D., Cornell U. Prof., Microbiology
VanEtten, Hans D., Ph.D., Cornell U. Assoc. Prof., Plant Pathology
VanSoest, Peter J., Ph D., U. of Wisconsin. Prof., Animal Science
vanTienhoven, Ari, Ph.D., U. of Illinois. Prof., Poultry and Avian Sciences
VanVleck, L. Dale, Ph.D., Cornell U. Prof., Animal Science
VanWambeke, Armand R., Ph.D., U. of Ghent (Belgium). Prof., Agronomy
Viands, Donald R., Ph D., U. of Minnesota. Asst. Prof., Plant Breeding and Biometry
Wagenet, Robert J., Ph.D., U. of California at Davis. Assoc. Prof., Agronomy
Walker, Larry P., Ph.D., Michigan State U. Asst. Prof., Agricultural Engineering
Wallace, Donald H., Ph.D., Cornell U. Prof., Vegetable Crops
Walsh, Patricia M., Ph.D., U. of Minnesota. Asst. Prof., Food Science
Walter, Michael F., Ph.D., U. of Wisconsin. Assoc. Prof., Agricultural Engineering
Walter, Reginald H., Ph.D., U. of Massachusetts. Assoc. Prof., Food Science and Technology (Geneva)
Ward, William B., M.S., U. of Wisconsin. Prof., Communication Arts
Wardeberg, Helen L., Ph.D., U. of Minnesota. Prof., Education
Warner, Richard G., Ph.D., Cornell U. Prof., Animal Science
Webster, Dwight A., Ph.D., Cornell U. Prof., Natural Resources
Weeden, Norman F., Ph.D., U. of California at Davis. Asst. Prof., Horticultural Sciences (Geneva)
Weires, Richard W., Ph.D., U. of Minnesota. Assoc. Prof., Entomology (Geneva)
Welch, Ross M., Ph.D., U. of California at Davis. Asst. Prof., Agronomy
Wheeler, Quentin D., Ph.D., Ohio State U. Asst. Prof., Entomology
White, Gerald B., Ph.D., Penn State U. Assoc. Prof., Agricultural Economics
White, Shirley A., Ph.D., Michigan State U. Prof., Communication Arts
Wien, Hans C., Ph.D., Cornell U. Assoc. Prof., Vegetable Crops
Wilcox, Darlene, Ph.D., U. of Florida. Asst. Prof., Vegetable Crops
Wilcox, Wayne F., Ph.D., U. of California at Davis. Asst. Prof., Plant Pathology (Geneva)
Wilkins, Bruce T., Ph.D., Cornell U. Prof., Natural Resources
Wilkinson, Christopher F., Ph.D., U. of California at Riverside. Prof., Entomology
Wing, Kenneth E., Ph.D., Cornell U. Prof., Agriculture
Wright, Madison J., Ph.D., U. of Wisconsin. Prof., Agronomy
Yarbrough, J. Paul, Ph.D., Iowa State U. Prof., Communication Arts
Yoder, Olen C., Ph.D., Michigan State U. Prof., Plant Pathology
Young, Frank W., Ph.D., Cornell U. Prof., Rural Sociology
Young, Roger G., Ph.D., U. of Oregon. Assoc. Prof., Entomology
Youngs, William D., Ph.D., Cornell U. Prof., Natural Resources
Zaitlin, Milton, Ph.D., U. of California at Los Angeles. Prof., Plant Pathology
Zall, Robert R., Ph D., Cornell U. Prof., Food Science
Zinder, Stephen H., Ph.D., U. of Wisconsin. Asst. Prof., Microbiology
Zitter, Thomas A., Ph D., Michigan State U. Assoc. Prof., Plant Pathology
Zobel, Richard W., Ph.D., U. of California at Davis. Assoc. Prof., Plant Breeding and Biometry/Agronomy
Zuiches, James J., Ph.D., U. of Wisconsin. Prof., Rural Sociology

College of Architecture, Art, and Planning

Administration

Ian R. Stewart, acting dean
John Shaw, acting associate dean
Wendy Phoenix, director of administrative services
Carol Cooke, director of external affairs
Charles L. Williams, director of minority educational affairs
M. Sophie Newhart, registrar
Betty Gangle, accountant
Margaret Webster, slide curator

Faculty Advisers

Freshmen are assigned faculty advisers for their first year and are also invited to share their concerns and seek advice from the volunteer student advisers at any time.

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:

M. Sophie Newhart, registrar
Charles L. Williams, director of minority affairs
Jerry A. Wells, chairman, Department of Architecture
Stanley J. Bowman, chairman, Department of Art
William Goldsmith, chairman, Department of City and Regional Planning

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 116,000 books, is capable of supporting undergraduate, graduate, and research programs. Some 1,900 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 300,000 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 or her 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 dismssal 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, 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, H. W. Richardson, C. Rowe, F. W. Saul, M. L. Schack, 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 apply, have established their interest and motivation to enter the field. It therefore incorporates both a general and professional educational base

The program is oriented toward developing the student's ability to deal creatively with architectural problems on analytical, conceptual, and developmental levels. The sequence courses in design, consisting of studio work augmented by lectures and seminars dealing with theory and method, are the core of the program. Sequences of studies in 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, thesis, history, special problems in architectural design, a professional seminar, and professional studies. 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. 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

Fall Term	*Credits*
101 Design I	6
181 History of Architecture I	3
151 Design Fundamentals I	2
191 Drawing I	2
Out-of-college elective	3
	16
Spring Term	
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

Fall Term	
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
Spring Term	
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

Fall Term	
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
Spring Term	
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

Fall Term	
401 Design VII	6
481 Professional Practice	3
Out-of-college elective	3
College elective	3
Departmental elective	3
	18
Spring Term	
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

Fall Term	
501 Design IX	6
or 503 Design IX—Thesis I	8
or 601 Special Program	9
In- or out-of-college elective	3
Out-of-college elective	3
Departmental elective	3
Out-of-college elective	3
	18, 20, or 21
Spring Term	
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 (minimum)	176

Elective Distribution Requirements

	Credits
Departmental electives	18
College or out-of-college electives	12
College electives	9
Out-of-college electives	27
Total electives	66

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 profesional 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 and 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 (Arch 395) in the first semester of their senior year. In the second semester there will be a 4-credit session (Arch 490) 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 or 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, including thesis, 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 (these fees are subject to change).

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, etc.

501 Design IX Fall or spring. 6 credits. Limited to department students.
Studios and sems, M W F 2–6. Staff.
Programs in architectural design and building typology investigations, and research leading to complete development of the student's thesis program. General instruction in the definition, programming, and development of a thesis is followed by tutorial work with the student's advisory committee.

502 Design X—Thesis Fall or spring. 8 credits. Prerequisite: Architecture 501. Required of B.Arch. candidates who must satisfactorily complete a thesis. Students accepted for admission to the Overlap Program are exempt from the thesis requirement.
Studios, M W F 2–6. Staff.

503–504 Design IX—Thesis I, and Design X—Thesis II Fall or spring. 8 credits each term. Prerequisite: permission of department.
Studios, hours to be arranged. Staff.
Students who have obtained approval may elect to spend two terms working on the thesis.

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. Variable credit (maximum, 3). Prerequisite: permission of instructor.
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 1984–85.
Staff.]

[613 Transportation Fall. 2 credits. Prerequisite: permission of instructor. Not offered 1984–85.
Sem, hours to be arranged. Staff.
The impact of various transportation forms on the environment is considered from the perspectives of architects, engineers, planners, and human ecologists. Readings and discussions of past, current, and future transportation modes focus on aesthetic and physical aspects.]

614 Low-Cost Housing Spring. 3 credits. Prerequisite: permission of instructor.
Sems, hours to be arranged. 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 1984–85.
Hours to be arranged. Staff and guest lecturers.
A broad range of issues and problems of urban and regional development and the context in which the designer functions are surveyed. Selected case studies are presented by the participants and visitors.]

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 and staff.
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. Staff.
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 and staff.
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; 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

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 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 sressed.

Nonsequence Courses

331 Special Problems in Principles, Theories, and Methods Fall or spring. Variable credit (maximum, 3). Prerequisite: permission of instructor.
Hours to be arranged. Staff.
Independent study.

[334 Computer Graphics (also Computer Science 417) Spring. 4 credits. Prerequisites: two terms of calculus and Computer Science 211, or equivalent. Not offered 1984–85.
Lecs, T R 9:05. 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. Prerequisite: Architecture 231–232 or permission of instructor. Not offered every year.
Lecs, T R 4:40–6:30. L. Hodgden.

336 Theory of Architecture Fall or spring. 3 credits. Limited to third-year students and above. Not offered every year.
Lecs, T R 4:40–6:30. L. F. Hodgden.
Theories of modern architecture: De Stijl, cubist and purist painting; industrialized architecture; Le Corbusier's architecture and urban theories, architectural sequence, facades, the free plan, "DOM-INO" theory.

337 Special Investigations in the Theory of Architecture I Fall or spring. Variable credit (maximum, 3). Prerequisite: permission of instructor.
Hours to be arranged. Staff.
Independent study.

338 Computers in Architecture Seminar Fall or spring. 2 credits. Prerequisites: Computer Science 100 or equivalent.
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 Fall or spring. 3 credits. Prerequisites: Computer Science 100 or second-year standing. Not offered 1984–85.
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 Architeture Fall or spring. 3 credits. Prerequisite: third-year status. Not offered every year.
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 ad 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. Investigation this semester will center on issues of the vertical surface.

437–438 Special Projects in Computer Graphics 437, fall; 438, spring. Variable credit (maximum, 4). 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 1984–85.
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 1984–85.
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 Spring. 3 credits. Prerequisite: permission of instructor.
Sem, hours to be arranged. V. Warke.
An inquiry into the fundamental principles of architectural criticism in theory and practice, with emphasis on the structures of criticism in the twentieth century.

637 Special Investigations in the Theory of Architecture II Fall or spring. Variable credit. Prerequisite: permission of instructor.
Hours to be arranged. Staff.
Independent study.

[639 Principles of Design Process Fall or spring. 3 credits. Limited to third-year architecture students and above; students in other colleges must have permission of instructor. Not offered 1984–85.
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

131 An Introduction to Architecture Fall. 3 credits.
Hours to be announced. P. Cohen and guest lecturers.
"Architecture for nonarchitects." Intended to familiarize non–architecture students with the profession of architecture through lectures, readings, and films. Examines past and present criteria for excellence in architecture and the notable designs and designers who achieve this. Related fields such as urban design, landscape architecture, structural design, interior design, computer graphics, and professional practice will be included.

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. M. Kubelik.
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, on the basis of 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.
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 every year.
Hours to be announced. 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. Not offered 1984–85
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 Spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor.
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 Fall (tentative). 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year; next offered spring 1986.
Hours to be announced. Staff.
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 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered 1984–85; 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. Not offered 1984–85; next offered 1985–86.
Hours to be announced. Staff.
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. Not offered 1984–85; next offered 1985–86.
Hours to be announced. Staff.
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. Staff.
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 (maximum, 3). Prerequisite: permission of instructor. May not be taken by students in design to satisfy undergraduate history requirements.
Hours to be announced. Staff.
Independent study for undergraduate students.

[396 Special Topics in Architectural History Spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 181–182 or permission of instructor. Not offered 1984–85; 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 every year.
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 every year.
Hours to be announced. Staff.
Topic to be announced by preregistration.

399 Special Topics in Architectural History Fall or spring. 3 credits. Limited to 30 students. Prerequisites: Archtecture 181–182 or permission of instructor.
Hours to be announced. Staff.
Topic to be announced by preregistration.

490 Undergraduate Thesis in Architectural History and Urban Development Fall or spring. 4 credits. For B.S. honors candidates in history only.
Hours to be arranged. Staff.

Freshman Seminar

190 The Language of Architecture Fall or spring. 3 credits. Not for students in the Department of Architecture. Freshman Seminar.
M. Reinberger.
An introduction to the issues and purposes in architecture. The metaphor of language will be used to discuss works of architecture both as formal

objects and as carriers of meaning when seen in their cultural contexts. Contemporary and historical examples, including local buildings, will be examined to develop students' skills in visual analysis and in "reading the messages" in architectural design.

Courses in Preservation

542 Methods of Archival Research (also City and Regional Planning 461) Fall or 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 (also City and Regional Planning 567) Fall. 3 credits. For undergraduate architecture students and graduate students in history and preservation. Prerequisite: permission of instructor.
Hours to be announced. M. A. Tomlan.
Combines study of architectural drawings as historical documents with exercises in preparing measured drawings of small buildings. Presents the basic techniques of studying, sketching, and measuring a building and the preparation of a finished drawing for publication.

544 Problems in Contemporary Preservation Practice (also City and Regional Planning 563) 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 or 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. C. Otto.
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. Staff.
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. C. Otto.
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. Staff.
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. Staff.
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 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. C. Otto.
Topic to be announced.

698 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.

699 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.

790 Informal Study in the History of Architecture and Urban Development Fall or spring Variable credit. Prerequisite: permission of 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

Darkroom fees for all photography courses (these fees are subject to change):
In-college students—$50 per term
Out-of-college students—$50 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 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 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 1984–85.
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 or 152, or permission of instructor. Not offered 1984–85.
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 1984–85.
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 (maximum, 3). Prerequisites: written proposal outlining the special project and permission of instructor. Not offered 1984–85.
Hours to be arranged. Staff.
Independent study.]

458 Special Project in Design Communication Fall or spring. Variable credit (maximum, 4). Limited to undergraduates. Prerequisites: written proposal outlining the special project and permission of instructor.
Hours to be arranged. Staff.
Independent study.

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 or spring. 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 Fall or 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 (maximum, 3). Prerequisite: permission of science staff instructor.
Hours to be arranged. Staff.
Topics to be announced. Independent study.

[**563 Energy-Efficient Microclimate Design** Fall or spring. 3 credits. Not offered 1984–85.
Hours to be arranged. Staff.]

[**564 Earth-sheltered Architecture** Fall or spring. 3 credits. Not offered 1984–85.
Hours to be arranged. Staff.]

[**662 Environmental Control Systems** Fall or spring. 3 credits. Prerequisite: Architecture 362. Not offered 1984–85.
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. Six credits each term. Open to architectural science 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 architectural science 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, J. Cole, N. D. Daly, R. Jessup, J. N. Locey, E. Meyer, E. Mikus, G. Page, S. Poleskie, L. Quin, 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

Students are expected to take an average course load of 16 credits per semester during their four years

First Year

Fall Term	*Credits*
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
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 or 4
Elective	3 or 4

Second Year

Fall Term	
251 Second-Year Drawing	3
100- or 200-level studio courses*	6
Art history elective	3 or 4
Elective	3 or 4
Spring Term	
252 Second-Year Drawing	3
100- or 200-level studio courses*	6
Art history elective	3 or 4
Elective	3 or 4

Third Year

Fall Term	
Third-year studio concentration	4
311 Issues of Contemporary Art	3
Electives	9
Spring Term	
Third-year studio concentration	4
Art history elective	3 or 4
Electives	8 or 9

Fourth Year

Fall Term	
Fourth-year studio concentration	6
Art history elective	4
Electives	6
Spring Term	
Senior thesis studio concentration	6
Art history elective	4
Electives	6

*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. Students concentrating in one area must complete all third- and fourth-year studio concentration courses. Students concentrating in two areas must complete studio concentration courses in three of the four semesters, in both areas. An additional 12 credits in history of art at the 200 level or higher or in architectural history must also be completed. Students must complete a senior thesis in one area of concentration and 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. Also, 12 of the total 21 required credits must be in introduction to art history courses at the 200 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. No student may study in absentia for more than two terms.

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. In addition, **there are darkroom fees for all photography courses** (these fees are subject to change): for in-college students the fee is $50 each semester, and for out-of-college students the fee is $50 plus $10 per term course fee.

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

Darkroom fees for all photography courses (these fees are subject to change):
In-college students—$50 per term
Out-of-college students—$50 plus $10 per term course fee.

161–162 Introductory Photo I (also Architecture 251) 161, fall or summer; 162, spring. 3 credits each term.
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.
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.
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. Not offered 1984–85.
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.
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. Not offered 1984–85.
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.
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 1984–85.
Staff.]

Graduate Thesis

712 Graduate Thesis Spring. Credit as assigned.
Staff.
For graduate students in their last term in the programs in painting, sculpture, printmaking, and photography.

Special Studio Courses

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

W. W. Goldsmith, chairman; R. S. Booth, P. Brandford, P. Clavel, S. Czamanski, J. F. Forester, B. G. Jones, D. B. Lewis, D. W. Nelkin, P. Olpadwala, K. C. Parsons, J. W. Reps, S. Saltzman, S. W. Stein, I. R. Stewart, M. A. Tomlan, T. Vietorisz (visiting), T. Werbizky

The department offers several programs of study at both the undergraduate and graduate levels.

The Undergraduate Program in Urban and Regional Studies

The program offers students an opportunity to direct 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, in 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 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.

Several graduate degrees are offered: the Ph.D.; the Master of Regional Planning [M.R.P.], for a two-year program; and, in special cases, the Master of Professional Studies (International Development) [M.P.S.(I.D.)], for the twelve-to-eighteen-month international planning program.

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. 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 R 3:30–5:30. W. W. Goldsmith.
A review of attempts by the various social sciences to understand the contemporary city and its problems, particularly as seen by planners. Material is drawn from urban and regional economics, human ecology, urban sociology, psychology, anthropology, and geography in order to explain the location, size, form, and functioning of cities. Traditional and contemporary critical theory is examined as it applies to physical, social, and economic problems of the modern city. Major texts will be read, criticized, and discussed in seminars. Students will participate in teams to work on current planning problems.

402 Spatial Analysis of Urban and Regional Systems Fall. 4 credits.
B. G. Jones.
Introductory review of theories dealing with the spatial distribution of population and economic activity, drawn from various social science disciplines such as geography, economics, and sociology. Review of recent research dealing with such topics as population distribution, migration, location of industry and economic activity, and the spatial organization of urban and regional social systems.

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. Prerequisite: intermediate-level economics or sociology or CRP 400.
T R 3:30–5:30. W. W. Goldmith.
A review of attempts by the various social sciences to understand the contemporary city and its problems, particularly as seen by planners. Material is drawn from urban and regional economics, human ecology, urban sociology, psychology, anthropology, and geography in order to explain the location, size, form, and functioning of cities. Traditional and contemporary critical theory is examined as it applies to physical, social, and economic problems of the modern city. Major texts will be read, criticized, and discussed in seminars. Students will participate in teams to work on current planning problems.

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.
M W F 10:10. 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. 3 credits.
J. Forester.
Planning is a form of social intervention. It parallels and complements other important decision-making institutions such as voting, interest-group bargaining, and market exchange. This course provides cases and analysis describing examples of alternative forms of planning and the various arguments used to justify planning: market failure, democratic participation, advocacy, and expert judgment. Political, organizational, and practical-ethical aspects of planning practice are explored. The course covers the work of Dyckman, Piven, Krumholz, Marcuse, Lindblom, Friedmann, March, and others.

[511 Concepts and Issues in Planning Practice Fall. Credit as assigned. Not offered 1984–85.
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 1984–85.
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 Plannng 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.
A 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 Plannng 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.
M W F 10:10; 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.

622 Information Systems for Planning and Policy Analysis Fall or spring. 3 credits. Prerequisites: CRP 521 or equivalent.
S. Saltzman.
An introduction to the design and use of computer-based information systems for planning and policy analysis. Topics will include data base and file-processing systems design, the use of large-scale social science data bases, and geographic data bases. Students will be expected to do a project on a Cornell mainframe computer using one of the data bases archived on the campus.

[623 Methods of Social-Policy Planning Spring. 3 credits. Prerequisite: CRP 521 or equivalent. Not offered 1984–85.
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 and Public Policy 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 descriptive statistics, sampling, estimation, hypothesis testing, and prediction will be introduced.

625 Statistical Analysis for Planning and Public Policy II Spring. 3 credits. Prerequisite: CRP 624.
Staff.
Continuation of City and Regional Planning 624.

[720 Quantitative Techniques for Policy Analysis and Program Management Fall. 4 credits. Not offered 1984–85.
D. Lewis.
Selected analytical techniques used in the planning and evaluation of public policy and public investments are examined. Topics include simulation modeling, benefit-cost and cost-effectiveness analysis (including capital budgeting), and optimization strategies.]

721 Simulation in Planning and Policy Analysis Fall or spring. 3 credits. Prerequisite: CRP 521 or equivalent.
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 1984–85.
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 (queuing 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 1984–85.
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 1984–85.
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. Prerequisite: basic economics and elementary matrix algebra.
R 10:10–12:05, plus optional workshops.
S. Czamanski.
The course covers main quantitative techniques used in city and regional planning. Emphasis is placed on formulation of models and derivation of testable hypotheses. Examples and applications to regional planning are discussed.

731 Optimization Techniques in Planning Fall. 4 credits. Prerequisites: basic economics, elementary calculus, and matrix algebra.
W 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 of 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. Not offered 1984–85.
W 10:10–12:05, plus optional workshops.
S. Czamanski.
The course focuses on issues of industrial, as distinct from agricultural, 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) Spring. 4 credits. Cosponsored by the Program on Science, Technology, and Society.
T R 2:30–4:25. D. Nelkin.
Social, environmental and economic implications of technologial 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. D. Nelkin.
A view of science less as an autonomous activity than as a social and political institution. We will discuss such issues as secrecy in science, ethical and value disputes, and the limits to scientific inquiry in the context of the changing relationships between science and the public.

445 Introduction to Public Policy Analysis and Management Fall or spring. 3 credits. A first-year graduate course open to seniors and juniors.
S. Saltzman.
An introduction to systematic methods and processes for analyzing issues and problems of public policy and management. The roles of economic analysis and of analytic techniques in public sector decision making will be reviewed and their respective strengths and weaknesses evaluated. Applications to a variety of public sector problem areas will be explored.

[540 Introduction to Social-Policy Planning Fall 4 credits. Not offered 1984–85.
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 Sociology 515) Fall. 4 credits. Cosponsored by the Program on Science, Technology, and Society.
W 2:30–4:25. D. Nelkin.
Political aspects of decision making in technical areas. Drawing from recent risk disputes, we will examine 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) Spring. 4 credits. Prerequisite: CRP 541 or permission of instructors. Cosponsored by the Program on Science, Technology, and Society.
Hours to be arranged. D. Nelkin.
A continuation of City and Regional Planning 541, focusing on political aspects of decision making in technical areas. Drawing from recent risk disputes, we will examine the origins and characteristics of "technical politics," the role of experts in government, and the problem of expertise in a democratic system.

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.

545 Introduction to Public Policy Analysis and Management Fall or spring. 3 credits.
S. Saltzman.
Introduction to systematic methods and processes for analyzing issues and problems of public policy and management. Roles of economics analysis and of analytic techniques in public sector decision making will be reviewed and their respective strengths and weaknesses evaluated. Applications to a variety of public sector problem areas will be explored.

642 Critical Theory and the Foundation of Planning Analysis Fall. Credit as assigned.
R 10:10–12:05. J. Forester.
Problems of social action are studied in the traditions following Marx, Weber, and Durkheim. Analyses of reproduction and resistance, normative order and power, meaning systems, and organizational action provide the bases for a consideration of Habermas's synthetic critical communications theory of society. Implications for planning practice, education, and research are drawn.

643 Legal Aspects of Public Administration Fall. 3 credits.
M W F 11:15. 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.

645 Planning and Policy Economics Fall or spring. 3 credits.
S. Saltzman.
An introduction to microeconomic principles useful in analyzing public sector problems and in choosing among alternative solutions. Applied aspects of welfare economics will also be considered. Additional topics will include relevant microeconomic concepts in public finance, cost-benefit analysis, and related areas. Applications to a variety of public sector problem areas will be explored.

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.

849 Informal Study in Social-Policy Planning Fall or spring. Credit as assigned.
Staff.

Urban Development Planning

[551 Suburbanization and Metropolitan America Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1984–85.
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.
S. W. Stein.
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 Development, 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. 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.
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 and spring. 2 or 4 credits.
Fieldwork hours to be arranged. Organizational meeting 10:10 first F of classes. S. Stein, T. Werbizky.
Interdisciplinary teams of students from planning, architecture, landscape architecture, historic preservation, and other environmental design disciplines work in classrooms with school children and teachers to deepen their understanding of the built environment and to encourage their participation in the shaping of their own environment. Work in local schools is emphasized.

557 Small-Town Community Design Workshop Fall or spring. 4 credits.
S. Stein and staff.
An in-depth approach to specific problems facing the small town or small city. Various aspects of planning, historic preservation, landscape architecture, and design, including "Main Street" revitalization, storefront rehabilitation, signage, and comprehensive planning, are explored in a workshop setting.

[651 Urban Land Policy and Programs Fall. 3 credits. Prerequisite: CRP 653 or permission of instructor. Not offered 1984–85.
M 1:25–3:15. J. W. Reps.
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.
W 3:35–5:30. K. C. Parsons.
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. 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 (also Architecture 393) Fall. 4 credits. No prerequisites.
M W F 9:05. 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.

560 Documentation for Preservation (also Architecture 546) Fall. 3 credits.
M 2:30–5:30. M. A. Tomlan.
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 548) 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. Tomlan.
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. 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.

564 Building Materials Conservation (also Architecture 547) Spring. 3 credits. Open to juniors, seniors, and graduate students.
M. A. Tomlan.
A survey of the development of building materials in the United States, chiefly during the nineteenth and early twentieth centuries, and a review of the measures that might be taken to conserve them.

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. Reps.
Urban and regional plans, planners, and plannng 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 Fall. 3 credits. Prerequisite: permission of instructor.
J. W. Reps.
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.

567 Measured Drawing (also Architecture 543) 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 drawing as historical documents with exercises in preparing measured drawings of small buildings. Presents the basic techniques of studying, sketching, and measuring a building and the preparation of a finished drawing for publication.

660 Seminar in the History of American City Planning (also Architecture 693) Fall. 3 credits. Prerequisites: CRP 462 or permission of instructor.
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.

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 1984–85.
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. Not offered 1984–85.
M W 9:05. 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 1984–85.
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. Not offered 1984–85.
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 1984–85.
S. Stein and guest lecturers.
Seminars covering the 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 1984–85.
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 a workshop-studio setting.]

670 Regional Planning and Development in Developing Nations Fall 4 credits Prerequisite: second-year graduate standing.
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 on the concepts of equity and efficiency, external economies, export linkages, and internal self-sufficiency and integration. Resource development, national integration, human development, and migration problems are discussed.

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 1984–85
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 1984–85.
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 1984–85.
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.

776 Seminar in Urban Policy and Planning in Developing Countries Spring. 2 credits
K. C. Parsons.
The national urban development policy and planning efforts of selected developing countries are examined in the context of urbanization theory and national spatial planning. Recent descriptive and critical literature is explored. Topics include secondary cities policies, national and urban transportation planning, city planning, sites and services project planning, housing, land policy, and urban development control systems.

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 asigned.
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. Limited to undergraduate students in the Urban and Regional Studies program. S-U grades only.
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 1984–85.
M W F 11:15. 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. 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 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 1984–85.
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 1984–85.
R 9:05. 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 Professionl 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 I Fall. Credit as assigned.
Staff.

796 Master's Thesis in Preservation Planning II 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, 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.

*Offered through the College of Agriculture and Life Sciences.

***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, L. Mirin.

***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.

***406 Studio: Senior Project** Spring. 6 credits.
R. T. Trancik, P. J. Trowbridge.

490 Special Topics in Landcape 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 members 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. Adleman, 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; discs to be arranged. L. Mirin.
A survey from clasical times to the present, emphasizing design principles and techniques that have establishd 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; 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. Not offered 1984–85.
Lec, disc, and field trips to be arranged. L. Mirin.
The principles and tehniques 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, L. Mirin.

***607 Studio: Professional Practice** Fall, weeks 1–7, 3 credits. Required 5-day field trip.
M. I. Adleman.

***609 Studio: Advanced Site Design** Fall, weeks 8–14, 3 credits.
M. I. Adleman.

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.

***690 Independent Reading and Research** Spring. 1–3 credits.
A. S. Lieberman.

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. Assoc. 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
Cole, James, M.F.A., Cornell U. Asst. Prof., Art
Crump, Ralph W., B.Arch., Cornell U. Prof. Emeritus, Architecture
Czamanski, Stan, Ph.D., U. of Pennsylvania. Prof., City and Regional Planning
Daly, Norman, M.A., Ohio State U. Prof. Emeritus, Art
Evett, 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., Dipl.Ing., Technical U. Karlsruhe (Germany), M.Arch., Cornell U. Assoc. Prof., Architecture
Goldsmith, William W., Ph.D., Cornell U. Prof., City and Regional Planning
Greenberg, Donald P., Ph.D., Cornell U. Prof., Architecture
Hascup, George E., B.Arch., U. of California at Berkeley. Assoc. Prof., Architecture
Hodgden, Lee F., M.Arch., Massachusetts Inst. of Technology. Assoc. Prof.
Jessup, Robert A., M.F.A., U. of Iowa. Asst. Prof., Art
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 Planing
Kira, Alexander, M.R.P., Cornell U. Prof., Architecture
Kubelik, Martin, Dr.Ing., 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, Elisabeth H., M.F.A., U. of Texas. Asst. Prof., Art
Mikus, Eleanore, M.A., U. of Denver. Assoc. Prof., Art
Miller, John C., M.Arch., Cornell U. Assoc. Prof., Architecture
Mirin, Leonard J., M.L.A., U. of Michigan. Assoc. Prof., Landscape Architecture
Mulcahy, Vincent J., M.Arch., Harvard U. 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
Poleskie, Stephen F., B.S., Wilkes Coll. Prof., Art
Quin, Langdon C., M.F.A., Yale U. Asst. 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
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
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
Tomlan, Michael A., Ph.D., Cornell U. Asst. 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
Inge Reichenbach, 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. 6	Feb. 7
Last day for adding courses without petition	Sept. 19	Feb. 15
Last day for dropping courses without $10 fee.	Sept. 19	Feb. 15
Last day for changing grade option (S-U).	Sept. 19	Feb. 15
Deadline for submitting independent major requests (second meeting).	Oct. 11	March 18
Last day for requesting leave of absence or withdrawal for the current term.	Oct. 24	March 22
Last day for dropping courses without petition.	Oct. 24	March 22
Deadline for requesting permission to study in absentia.	End of the preceding semester	
Advance course enrollment for the following term (tentative).	Oct. 29–Nov. 9	April 8–19
Deadline for applying to the College Scholar Program.	Last day of study week, May 15	
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, mathematics, the social sciences, and the expressive arts. It is also a college within a university, and this wider community provides strength and diversity not available in an isolated undergraduate institution. Students may draw upon the knowledge and facilities of the other undergraduate colleges at Cornell to supplement their studies. Finally, the college is a graduate school and research center attracting faculty whose 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 each student's education should have certain characteristics.

These characteristics include familiarity with several different ways of knowing that are reflected in the natural sciences, in the social sciences, and in those achievements of intellect and imagination that are the focus of the humanities and the expressive arts. In addition to these general areas of knowledge, students study foreign languages, acquire effective writing skills, and concentrate on one particular field to develop, as fully as possible, the powers of imaginative and critical thinking. To accomplish these objectives, the college has certain requirements for graduation.

Summary of Basic College Requirements for Graduation

1) **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-semester 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. 96.
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 semesters, unless a student can successfully complete the other requirements in fewer than eight semesters and is allowed to accelerate graduation. See p. 00.
9) **Physical education:** Completion of the University requirement. See p. 22.

Ordinarily a student may not use the same course to fulfill more than one college requirement. See p. 97.

Minimum Number of Courses and Credits

Students who are first admitted to college in the fall of 1980 or thereafter must complete at least thirty-four courses to graduate, that is, four or 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), two in the same series 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 fifty courses offered by over a dozen 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.

The language requirement may be satisfied in one of two ways:
1) by attaining *proficiency* in one language or
2) by attaining *qualification* in two languages.

Proficiency

Proficiency is attained by passing a 200-level course (or Chinese or Japanese 161) or by equivalent achievement, to be determined by examination; see below under "Advanced Standing Credit."

Qualification

Qualification may be attained in any of the following four ways.

1) Three years of high school study in any one language gives qualification in that language. Note, however, that this route to qualification does not guarantee entrance into a 200-level course. The student who wants to continue in this language must be placed by examination.
2) Passing the requisite course: 102, 123, or 134 in languages taught by the Department of Modern Languages and Linguistics; Chinese 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 be awarded credit for their bilingual ability. Their English achievement is measured by the Test of English as a Foreign Language (TOEFL), a requirement for matriculation; their performance in one other language learned outside the academic environment is measured by examination, and evidence 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 can 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.

French

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)	

German

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)	

Italian

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)	

Russian

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)	

Spanish

CPT Reading Score	*Language Courses*	*Literature Courses*
Below 450	121	
450–559	123	
560–649	203	201
	211	
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 181–182, History of Architecture I and II, in the Department of Architecture of the College of Architecture, Art, and Planning, to fulfill the requirement in expressive arts. 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, 460, 484, 485, 495, 550.
Anthropology: Any two courses in the Department of Anthropology, or Archaeology 100 and any anthropology course.
Archaeology: Archaeology 100 and any one of the following: Archaeology 203, 309, 317, 358, 361, 401, or Anthropology 216, 250, 352, 354, 355, 356, 358, 359, 361, 435, 456, 493, 494, 656, 663, 664, 666, 667.
Asian Studies: Any two courses at the 200 level or above given by the Department of Asian Studies, or cross-listed with Asian Studies, in anthropology, economics, government, linguistics, or sociology.
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, 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, 491.
Sociology: 101–102 or one of these courses followed by any 200-level course in sociology.
Women's Studies: (a) Any two of 238, 244, 277, 321, 353, 355, 422; or (b) any one of 110, 362, 493, plus one course from list a. (Appropriate courses in Women's Studies taken previously may be approved by the program.)

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. (Appropriate courses taken previously may be approved by the program.)

Group 3: Humanities or Expressive Arts

a. Humanities
Africana Studies: Any two of 219, 422, 431, 432, 455.
Archaeology: Archaeology 100 and any of the following: Archaeology 275, 310, 358, 361, 362; Classics 220, 221, 232, 233, 309, 320, 321, 322, 323, 325, 327, 329, 330, 350, 358, 360, 423, 431, 450, 629, 630; Near Eastern Studies 243, 261, 263, 361, 362, 364, 365, 366, 367, 461.
Asian Studies: Any two courses in Asian art, literature, or religion, at the 200 level or above, given by the Department of Asian Studies or cross-listed with Asian studies.
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, 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: (a) Any two of 248, 249, 251, 348, 399, 453, 456, 467, 476; or (b) any one of 110, 362, 493, plus one course from list a. (Appropriate courses in Women's Studies taken previously may be approved by the program.)

b. Expressive Arts
Africana Studies: Any two of 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, 328, 329, 330, 423, 431.
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 to acquiring depth and competence in a major subject. The choice of major is not intended to define a student's education or to lead to a lifetime's occupation, although it may do so. By majoring, students can do advanced work and focus the full extent of their imaginative and intellectual capacities on something they care about and thereby sharpen their minds.

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 into the 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, almost one-third are free electives. Students must complete four or five courses or at least 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.
4) Students who choose to double major may use the courses for one major as "related" hours in the other major if the subjects are indeed related and if the departments approve.

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, and credits earned by transfer students at their first university).

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 100 or present convincing academic reasons for part-time study.

Ninth term. Students may spend a ninth term in residence by notifying the Records and Scheduling Office, M46 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. 22. 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 of undergraduate study. They must complete the physical education requirement. All College Scholars must complete a senior project. They are not required to complete or fulfill the distribution 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. Both majors will be posted in the official transcript.

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 degree from the Department of Art in the College of Architecture, Art, and Planning, or (3) a Bachelor of Science degree in urban and regional studies from the Department of City and Regional Planning in the College of Architecture, Art, and Planning. The dual degree program ordinarily takes five years to complete. Students enter one of these colleges as freshmen and begin the dual degree program with the College of Arts and Sciences 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, 135 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. Semi-intensive courses afford students the option of accelerating the development of language skills.

FALCON Program (Full-Year Asian Language Concentration). FALCON allows students who are interested in the Far East to study Chinese, Japanese, or Indonesian exclusively for one year. They gain proficiency in the language and familiarity with the culture. 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.

The adviser for students in the College of Arts and Sciences who are applying to law school is 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 Health Careers Office in Barnes Hall for help in planning their undergraduate program. The adviser for students in the College of Arts and Sciences who are planning careers in medicine is Assistant Dean Janice Turner.

Off-Campus Programs

Study in Absentia: Abroad or in the United States

Many students find it important 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. In 1983–84, 107 students studied abroad. The college sponsors very few programs abroad; 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 departure. 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. Advance course scheduling is the best time to discuss long-range goals with faculty advisers. Decisions can be changed at the beginning of the term, so during advance course scheduling students and faculty can discuss serious options to be contemplated. 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, but they reflect the official record and should be corrected in the Records and Scheduling Office if they are incorrect.

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 may be withdrawn from the college.

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. Forging signatures or credentials on college forms is 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.

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 major adviser. They must petition to accelerate in their sophomore year. Students who decide to accelerate during their last two semesters will need to present 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 forms in the Records and Scheduling Office. After the third week of classes, courses may be added, and after the eighth week courses may be dropped, *only* by petition. Petitions for late drops will be approved only if the student has been working steadily in the course (unless the registration is an error) and if the instructor and adviser agree that dropping the course makes sense. Drops approved after the eighth week will be noted on the transcript by a "W" where the grade would normally appear.

For each course change approved *after* the third week there is a $10 fee. Students must obtain the approval of the course instructor and their 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.

Leaves of Absence

Taking time off from college to think about goals and progress, to gain additional experiences or funds, or just to take a break from studying can be useful. Students in good standing who take a leave by the end of the eighth week of the semester are welcome to register in the college the following semester. Five years is the maximum length of time a student may be on leave and return without special permission. Leaves of absence are of four types.

1) *Personal leaves* 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. 101.

Any student who wishes to take a leave of absence should consult an assistant dean in the Academic Advising Center. 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, she or he may petition to have credits accepted as part of the 20 out-of-college credits of the 120 credits needed for graduation. Approval depends upon the judgment of the relevant departments and acceptable grades.*

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 end 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 from one college or school at Cornell into another is attractive for many students whose intellectual interests change. Students who wish to transfer 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 semester. Interested students should see Assistant Dean Rosenberg or 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 that 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 1984–85 pay $315.42 per credit plus the full administrative and student service fees of $1015 per semester. Students who fail to meet graduation requirements in eight semesters may petition the college to enroll in the Division of Extramural Courses.

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. 95–96.) No more than 20 credits in courses not commonly given by the College of Arts and Sciences may be applied toward the degree. All students must complete thirty-four courses. Transfer students must successfully complete at least 60 credits at Cornell; they must be in residence for four semesters, not counting Summer Session.

Advanced placement credit. See pages 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 Records and Scheduling Office, 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 Lynne S. Abel, associate dean of the college, 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. Students who wish to take a course without credit or audit a course simply ask permission of the course instructor. The college encourages its students to take advantage of its rich curriculum by sitting in on courses that interest them but cannot be fit into their schedules for credit. As long as the instructor agrees, students are welcome to visit courses. Small seminars and language courses are sometimes not open to casual visitors.

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 changed, both grades will appear on the transcript and will be included in any average that is calculated, but credit will be counted toward the degree only once. Students who plan to repeat a course should 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. If a student completes only three courses, all grades must be above a D.

Honors

Dean's List

The requirements for the Dean's List are based on the number of letter grades of A (i.e., A, A+, or A–) a student receives for grades. S grades and credits for S grades are not considered. Students must have the following number of grades of A: 12 credits, all A's; 13 or 14 credits, 10 A's, the rest B's. For 15 credits students must have 8 credits of A's, the remainder B s. In the 15-credit category, if any of the letter grades received are C or C+, there must be a balancing number of A credits in addition to the 8 credits of A's. Grades of C– or below are automatic disqualification from the Dean's List. Any failure or grade of U in a course that counts toward credit for graduation disqualifies students for the Dean's List.

***Incomplete* grades.** Qualification for the Dean's List is determined by 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.

Makeup grades for *incompletes* are considered towards the Dean's List as if they were S-U grades. *Students must first meet the basic criteria of qualifying for the List without consideration of the make-up grade or the credits of that grade.* If the grade would otherwise not disqualify students from making the Dean's List (no U's or C– or below), then they will be retroactively added to the Dean's List.

Courses not considered toward the Dean's List are any courses that do not fulfill any of the college requirements for graduation (see the section on "Noncredit Courses" above). In addition, credits for courses graded S and courses with "W" (withdrawn after the eighth week of classes) are not considered in the calculation of the Dean's List.

Two-term honors courses are not usually given a letter grade until work is completed. Consideration for the Dean's List is made when the grade is issued. This grade is used at one-half the credit value toward the previous semester's computation. For example: an 8-credit two-term grade of A– would be counted as 4 credits A– for the first semester of the honors work and 4 credits A– for the second semester. If the grade and hours are sufficient to qualify the student for the previous term, the student is then retroactively added to the Dean's List.

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 60 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 one D in a schedule with only three courses, or any F or U grades; if they have not made satisfactory overall progress in grades or credits (whether due to failures or *incompletes*) or in the requirements of the college or the major. Such students 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 dismiss a student from the college because of a highly unsatisfactory record for one term or for failure to make satisfactory overall progress in grades, credits, or the requirements of the major. This action expels the student permanently from the college. "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 for in absentia study and dual degree programs
Margaret C. Unsworth, assistant dean, sophomores and juniors
Lawrence Watson, assistant dean, seniors
Janice P. Turner, assistant dean for minority affairs
Jane Levy, career counselor

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.)

General Education Courses

The introductory and advanced courses offered by departments in their respective disciplines and fields comprise the bulk of the curriculum in the College of Arts and Sciences. Most of these courses are accessible to almost all students who are interested in them. However, the faculty of the college also offers general education courses, including interdisciplinary courses for a broad audience, courses that provide insight into a particular discipline for students who are not specializing in that field, and courses for advanced students that consider a discipline in terms of its history, its presuppositions, or its relation to other branches of knowledge. The following courses have been identified by the various departments of the College of Arts and Sciences as particularly appropriate, by that definition, for general education. For full course descriptions consult the departments' sections of the catalog.

American Studies

Some professors in English and history with an interest in American studies regularly teach courses that emphasize the interconnections of literary and historical materials. Some courses, such as History 275, focus on these interconnections with a nonspecialist audience in mind; others, such as English 464, aim at an upper-level audience to put literature and history in a comparative perspective with respect to a common referrent. These purposes may suit not only American studies, English, or history majors, but the general-education interests of nonmajors. Members of the American studies committee can be consulted about the pertinence of their courses to general education.

Archaeology

Several members of the Archaeology Program offer general education courses suitable for nonmajors. These are listed under the departments that offer archaeology courses, such as the Departments of Anthropology, Classics, History of Art, and Near Eastern Studies. The Archaeology Program also offers:

203 Early People: Human Cultural and Biological Evolution (also Anthropology 203) Fall. 3 credits.
T R 1–2:15. T. P. Volman.

Asian Studies

211 Introduction to Japan Fall. 3–4 credits.
M W 11:15 plus disc, F 9:05, 11:15, or 1:25. Staff.

212 Introduction to China Spring. 3–4 credits.
T R 1:25 plus disc, R 2:30, or F 10:10 or 11:15. E. Gunn.

215 Introduction to India, Nepal, and Sri Lanka Fall. 3–4 credits.
M W 11:15 plus disc to be announced. D. Holmberg.

313 The Japanese Film Spring. 3 credits.
Lec, W 7:30 p.m.; disc, R 9:05, or F 11:15 or 12:20. One required film viewing W 4:30; one optional film viewing M 4:30. Staff.

Chemistry

205 The Art of Science: Relations between the Two Cultures Fall. 3 credits. S-U grades only.
Lec, T 2:30–4:30. J. C. G. Calado, R. Hoffmann.

Classics

211 The Greek Experience Fall. 3 credits.
M W F 11:15. F. Ahl.

212 The Roman Experience Spring. 3 credits.
M W F 11:15. Staff.

236 Greek Mythology (also Comparative Literature 236) Fall. 3 credits.
T R 8:40–9:55. Staff.

238 The Ancient Epic Fall. 3 credits.
M W F 10:10. K. Clinton.

English

See, in the department's listing, "Courses Primarily for Nonmajors," p. 132.

German Literature

314 Nietzsche, the Man and the Artist Spring. 4 credits.
T R 2:30–3:45. S. L. Gilman.

327 Health and Disease Fall. 4 credits.
M 1:25–3:25. S. L. Gilman and others (Common Learning course).

399 Forms of Opposition: German Women Writers on the Nazi Period (also Comparative Literature 399 and Women's Studies 399) Spring. 4 credits.
T R 12:20–1:35. C. A. Martin.

History of Art

350 The Culture of the Early Renaissance (also History 361 and Comparative Literature 361) Fall. 4 credits.
T R 1:25–2:15 plus one disc, T 2:30–3:20, or W 9:05, 1:25, or 2:30. C. Lazzaro and J. Najemy.

351 The Culture of the Later Renaissance (also History 364 and Comparative Literature 364) Spring. 4 credits.
T R 1:25–2:15, plus one disc, R 2:30, or F 1:25 or 2:30. E. Dotson and C. Kaske, with C. Arroyo, C. Holmes, J. Najemy, E. Morris.

Psychology

326 Evolution of Behavior Fall. 4 credits.
T R 2:30–4:25. R. Johnston.

418 Psychology of Music Spring. 3 or 4 credits.
M 2:30–4:25. C. Krumhansl and R. Shepard.

Russian Literature

329 Eastern Europe Today: Economics, Government, Culture (also Economics 329 and Government 326) Fall. 4 credits.
T R 2:30–3:45. G. Gibian, M. Rush, G. Staller.

369 Dostoevsky Fall. 4 credits.
M W F 10:10. Staff.

390 The Power of Nationalism: Expressions of National Feeling in Politics, Economics, Literature, and the Arts (also Comparative Literature 390) Fall. 4 credits.
W 2:30–4:30. G. Gibian and others (Common Learning course).

418 Pedagogy and the Nineteenth-Century Novel (also Comparative Literature 418 and Society for the Humanities 418) Spring. 4 credits.
M 2:30–4:30 plus one hour to be arranged. P. Carden.

Akkadian

See Department of Near Eastern Studies, p. 181.

American Studies

S. M. Blumin, chairman and director of undergraduate studies (321 McGraw Hall, 256-3359); M. J. Colacurcio, R. L. Moore, R. Polenberg, F. Somkin, S. C. Strout

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 European, 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, B. Lambert, T. F. Lynch, K. S. March, C. Morris, J. T. Siegel, R. J. Smith, P. R. Sullivan

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.

Anthropology takes humanity in the broadest sense as its subject matter. Two 100-level courses (Anthropology 101–102) are intended to provide a general introduction to the anthropological enterprise in its varied dimensions. Several 200-level courses (203, 212, 214, 216) explore major strategies for doing anthropology, lessons learned so far, and questions remaining to be explored. Nature and Culture (211) focuses on fundamental questions about the relationships between the biological and cultural facets of human nature. The other departmental courses deepen and broaden the perspectives anthropology has brought to bear on the study of humankind. Because anthropology is intrinsically intersdisciplinary, all courses numbered below the 500 level 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 or 200 level that provide a broad overview of the discipline as a whole and its major subdisciplines: anthropological archaeology, biological and ecological anthropology, and sociocultural anthropology. Courses that provide such an overview include Anthropology 101, 102, 203, 211, 212, 214, and 216. Preferably these courses will be taken in the freshman and 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. Because 211 provides a synthesis of the relationships between the biological and cultural dimensions of human nature, it is also recommended for majors.
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. In addition, the department has a collection of archaeological and ethnological materials used in teaching and research.

Special Programs

Specialized individual study programs are offered in Anthropology 497–498, Topics in Anthropology, open to a limited number of juniors and seniors who have obtained consent of the instructor. Undergraduates should also note that most 600-level courses are open to them if consent of the instructor is obtained.

The Department of Anthropology holds colloquia throughout the academic year. Faculty members from Cornell and other universities participate in discussions of current research and problems in anthropology. Students are encouraged to attend.

Anthropology majors have also established an anthropology club, which sponsors educational and social events in conjunction with graduate students and faculty in the department.

I. Introductory Courses (Including Freshman Seminars)

101 Introduction to Anthropology: Biological and Prehistoric Perspectives on the Development of Humankind. Fall. 3 credits (4 by arrangement with instructor).
M W F 12:20. Staff.
The development of the human capacity for culture and its broad implications are explored through a consideration of the development of humankind from remote protohuman origins to the emergence of ancient civilizations. Biological anthropology and anthropological archaeology provide the conceptual tools that address these facets of human life.

102 Introduction to Anthropology: Social-Cultural Perspectives on Humankind Spring. 3 credits (4 by arrangement with instructor).
M W F 10:10. C. J. Greenhouse.
The social variability of human groups manifested in institutions such as kinship, family, economies, government, and religion, and the significance of the cultural differences on which this variability is based, are explored through reading firsthand accounts of relevant ethnographers; films and discussions supplement the lectures.

121 Encounters with Other Cultures Spring. 3 credits. Freshman Seminar.
M W F 1:25. B. Lambert.
A survey of writing by anthropologists and other travelers who have told of their experiences as participants in other societies and as interpreters of other cultures. Students discuss and write about ways of playing the outsider's role and changes in the traveler's own outlook. Some of the lectures deal with the cultural contexts of the readings and thereby provide an introduction to the materials of cultural anthropology.

127 Anthropology of the Arts Fall. 3 credits. Freshman Seminar.
M W F 12:20. M. Roseman.
Anthropology approaches the performing arts as an entry to cultural values, ideals, and fantasies. Dance, theater, musical, and ritual performances are investigated as cultural statements. The forms of performance and the nature of aesthetic responses will be examined through examples drawn from various societies. The performance event will be viewed ethnographically as a presentation socially organized by performers and audience members within a cultural context. This Freshman Seminar focuses on writing as a central aspect of anthropology observation, description, and interpretation.

130 Apes and Languages Fall and spring. 3 credits. Freshman Seminar. (*Note:* five Monday evening classes will replace five regular Monday or Tuesday classes.)
130.1, T R 8:40–9:55, B. J. Lantz. 130.2, M W F 9:05. 130.3, M W F 2:30, P. Donato.
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? What aspects of communication do humans and other primates share? How do the ape language experiments contribute to our understanding of our relationship to other animals? A selection of popular and scholarly books and articles will be examined in order to better understand the key issues in the debate over the language capacities of apes.

[150 The Discovery of America Spring. 3 credits. Freshman Seminar. Not offered 1984–85.]

205 Ethnographic Films Fall and spring. 2 credits.
W 7:30–9 p.m. Staff.
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.

211 Nature and Culture Spring. 3 credits (4 by arrangement with instructor).
M W F 1:25. P. S. Sangren.
Cultural anthropology, because it encompasses the comparative study of man in society, provides a unique vantage on the nature of man. One of the focal questions of the discipline is the relationship between the physical/biological and symbolic/moral worlds in which we live. This inquiry places anthropology squarely at the center of social theory, since all social theories and political ideologies are founded on premises regarding human nature. Through study of a variety of issues and debates (e.g., "sociobiology," the origin and meaning of the incest tabu), this course examines a variety of past and current attempts to explain the relationships between nature and culture in human life.

[212 Social Anthropology Fall. 3 credits (4 by arrangement with instructor). Not offered 1984–85]

214 Humankind: The Biological Background Spring. 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 bases for the diversity of cultural behaviors. Lectures are supplemented with films and guest lecturers.

[216 Ancient Societies Fall. 3 credits (4 by arrangement with instructor). Not offered 1984–85.]

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.
T 2:30–4:25. P. S. Sangren, 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. Not offered 1984–85.]

[250 The Earliest Civilizations Fall. 4 credits. Not offered 1984–85]

[352 Interpretation of the Archaeological Record Fall. 4 credits. Not offered 1984–85.]

[354 The Peopling of America Fall 4 credits Not offered 1984–85.]

355 Archaeology of Mexico and Central America Spring. 4 credits.
M W F 2:30. J. S. Henderson.
Prehistoric cultural developments in Mexico and Central America from the emergence of settled farming life, through the rise of states, to the European conquest. Emphasis is on the Olmec, Maya, and Aztec civilizations.

[356 The Archaeology of South America Spring. 4 credits. Not offered 1984–85.]

358 Archaeological Research Methods (also Archaeology 358) Spring. 4 credits. Prerequisite: permission of instructor.
Hours to be arranged (off campus, in Chile).
T. F. Lynch.
Techniques of archaeological survey, excavation, and analysis and their theoretical foundations. A wide variety of methods and problems will be considered, with emphasis on situations encountered in South America.

361 Field Archaeology in South America (also Archaeology 361) Spring. 10 credits. Prerequisite: permission of instructor.
Hours to be arranged (off campus). T. F. Lynch.
Participation in archaeological survey, excavation, and laboratory work in the Atacama desert, puna, and precordillera of northern Chile. This practical training session is part of a collaborative program with Chilean universities, serving equal numbers of Chilean and North American students (eight). Research will focus on late glacial hunting and gathering adaptation to a now-desert environment, seasonal transhumance and the development of institutionalized economic complementarity, and excavation of an Inca tambo. Students will learn diverse archaeological field methods by taking part in a regional research project.

[435 Investigation of Andean Institutions: Archaeological Strategies Spring. 4 credits. Not offered 1984–85]

493 Seminar in Archaeology: Ceramic Analysis Fall. 4 credits.
R 2:30–4:30. J S. Henderson.
Descriptive frameworks and analytical techniques for dealing with archaeological assemblages of pottery. Consideration of technological features, shape, and decoration, with emphasis on the problems of classification. A major part of the course will involve an independent project using pottery collections available at Cornell.

[494 Seminar in Archaeology: Settlement Archaeology Spring. 4 credits. Not offered 1984–85]

IV. Biological and Ecological Anthropology

[375 Ecology and Human Biology Fall. 4 credits Not offered 1984–85]

476 Human Nature: An Evolutionary Perspective Spring. 4 credits. Prerequisite: permission of instructor.
M W F 2:30. R. Dyson-Hudson.
Is human nature infinitely maleable, or is our behavior constrained by evolutionary adaptations to past environments? In this course we explore the evidence for the sociobiological tenet that human behavioral as well as morphological and physiological characteristics have evolved through natural selection. The political and social implications of both extremes—enviornmental and genetic determinism—are discussed. General categories of behavior discussed include aggression, infanticide, territoriality, dominance and hierarchy, bonding, and sex-role differences.

V. Sociocultural Anthropology

220 Meaning across Cultures Spring. 4 credits.
T R 10:10–11:25. J. A. Boon
Are societies machines, therapies, religions, dramas, stories, texts, games, aesthetic forms, structural codes? We assess such possibilities in anthropological views of different cultures: from cosmologies and ceremonies of tribal systems, to expressive genres of archaic hierarchies, to differentiated arts and sports of nation states. Principles of language and culture and symbolic interpretation are introduced.

228 Law and Culture Fall. 4 credits.
M W F 11:15. C. J. Greenhouse.
A cross-cultural examination of interpersonal dispute settlement. Specific questions focus on social structures and ideologies of conflict, modes of dispute processing, remedial choice-making, the nature of rules, access to justice, and law as a form of social knowledge. Readings consist primarily of recent monographs, and discussions will stress the relationship of legal ideas to their cultural matrix.

242 American Indian Philosophies I: Power and World Views (also Rural Sociology 242) Fall 3 credits. Enrollment limited to 20 students. Prerequisites: Agriculture and Life Sciences 100, Anthropology 230, or 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 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.

243 American Indian Philosophies II: Native Voices (also Rural Sociology 243) Spring. 3 credits. Enrollment limited to 20 students. Prerequisites: Agriculture and Life Sciences 100, Anthropology 230, or permission of instructor.
T R 2:30–3:45. S. C. Saraydar.
An exploration of the diverse expressions of philosophy to be found in the words of American Indians. Novels, political treatises, speeches, autobiographies, and other sources reflecting Indian attitudes on a variety of subjects will be examined for beauty and power of expression as well as to identify recurring themes.

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. 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.
T R 8:40–9:55. D. J. Greenwood.
In modern evolutionary theory, human biology, behavior, and institutions are understood as the ongoing products of interactions between human biological evolution and cultural change. Nevertheless, numerous attempts to examine evolutionary processes in humans violate key tenets of evolutionary theory, unwittingly reproducing elements of pre-Darwinian views of human nature. After reviewing the pre-Darwinian context and reading *The Origin of Species*, the course explores attempted applications of evolutionary analysis to humans and develops a cultural explanation of the persistence of pre-Darwinian elements in many of them.

[305 Psychological Anthropology Fall 4 credits Not offered 1984–85.]

312 Issues in Biology and Society: The Anthropology of Medicine (also Biology and Society 312) Spring. 4 credits. Enrollment limited to 15 students. Prerequisites: Anthropology/Biological Sciences/Biology and Society 301 and permission of instructor.
R 2:30–4:30. D. J. Greenwood.
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.

[321 Sex and Gender in Cross-Cultural Perspective (also Women's Studies 321) Fall. 4 credits. Not offered 1984–85.]

[322 Comparative Religious Systems Spring. 4 credits. Not offered 1984–85.]

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. Not offered 1984–85]

326 Economic Anthropology Fall. 4 credits.
T R 10:50–12:05. P. S. Sangren.
Economic anthropology is the study of the organization of production, distribution, and associated values in radically different primitive and peasant societies. The course introduces the major competing stances—formalist (neoclassical), substantivist, and Marxist—that have developed frameworks for analysis of exotic economic systems. Other topics include the integration of local communities with larger economic systems, the articulation of capitalist and noncapitalist modes of production, and a critique of theories of economic development from an anthropological perspective.

[329 Power and Culture Spring. 4 credits. Not offered 1984–85]

[367 American Indian Tribal Governments (also Rural Sociology 367) Fall. 4 credits. Not offered 1984–85]

[422 Special Problems in the Anthropology of Sex and Gender (also Women's Studies 422 and Biology and Society 405) Fall 4 credits. Not offered 1984–85.]

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 1984–85.]

428 Spirit Possession, Shamanism, Curing, and Witchcraft (also Women's Studies 428) Spring. 4 credits.
T 10:10–12:05. D. H. Holmberg.
An anthropological consideration of witchcrafts, shamanism, curing, and cults of spirit possession with special attention to the play of gender. Classic anthropological accounts of non-Western societies will be considered along with ethnographic and historical accounts of Western societies. The course also addresses general problems in the study of women and gender and the anthropology of myth, ritual, and symbolism.

[442 American Indian Philosophies: Selected Topics (also Rural Sociology 442) Spring. 4 credits. Not offered 1984–85.]

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 *Frank Film*. 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 1984–85]

[454 The Anthropologist's America: Expository and Creative Writing Spring. 4 credits. Not offered 1984–85]

[455 Theatre of Anthropology Spring 4 credits. Not offered 1984–85]

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 boredom, music, fashion, and odors, 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, ethnoscience, and structuralism.

[414 Anthropology and History Spring. 4 credits. Not offered 1984–85]

417 Structuralism Spring. 4 credits.
T 2:30–4:25. J. A. Boon.
A study of the corpus of Claude Levi-Strauss and a reading of diverse structuralist texts that raise general issues in philosophy, criticism, and the comparative method. An effort is made to assess the place of structuralism in the history of ideas.

[420 Development of Anthropological Thought Spring. 4 credits. Not offered 1984–85.]

[425 Ritual Structures and Cultural Pluralism Fall. 4 credits. Not offered 1984–85]

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 Iroquois (also Agriculture and Life Sciences 318) Spring 3 credits. (4 by arrangement with instructor).
T R 10:10–11:25. S. C. Saraydar.
The development of Iroquois (Hodenosaunee) culture patterns is examined in depth from the prehistoric Archaic period to the present day. Changes in cultural ecology, social organization, and world view are examined. Supplemental information is drawn from accounts of neighboring groups in southern Canada and western New England. Approximately one-third of the course is devoted to contemporary issues faced by the Iroquois people.

331 The United States Fall. 4 credits.
M W F 9:05. C. J. Greenhouse.
How do Americans define their own culture? The course examines attitudes about work, success, the marketplace, social control, and the political process in relation to central images of American identity: freedom, equality, and individualism. This is a discussion seminar that is designed to include the students' own observations as an integral part of the course in the form of field assignments. Readings combine contemporary American ethnography with forays into popular social analysis and commentaries by foreign travelers.

[333 Ethnology of the Andean Region Fall. 4 credits. Not offered 1984–85.]

334 Ethnology of Island Southeast Asia Fall 4 credits.
R 2:30–4:25. 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.
M W F 1:25. A. T. Kirsch.
A survey of the peoples and cultures of mainland Southeast Asia from prehistoric to contemporary times.

[336 Ethnology of Oceania Fall. 4 credits. Not offered 1984–85.]

342 Culture and Society in South Asia Fall. 4 credits.
M W F 10:10.
This course is a general introduction to Hindu, Buddhist, tribal, and Islamic societies of South Asia, with particular attention to India, Sri Lanka, Nepal, and the Himalayan kingdoms. Through ethnographic, historical, and literary accounts, features of South Asian cultures and societies will be considered in contrast and dynamic communication. The course proceeds descriptively, working through myriad social, ritual, and mythic expressions, toward an understanding of variability in South Asian cultures and of comparative ethnology.

343 Religion, Family, and Community in China Spring. 4 credits
M W F 10:10. P. S. Sangren.
The course provides anthropological perspectives on family and kinship, religion and values, economy and polity, and social organization in China. Both traditional society and culture and transformations in the People's Republic of China are considered. A major goal of the course is to provide a deeper understanding of the social and cultural fabric of the world's largest and longest-lived civilization.

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 1984–85.]

[433 Andean Thought and Culture Spring. 4 credits. Not offered 1984–85.]

456 Mesoamerican Thought Fall. 4 credits.
T 2:30–4:25. J. S. Henderson and P. R. Sullivan.
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 religion and history.

VIII. Related Courses in Other Departments

Introduction to Archaeology (Archaeology 100)

Archaeology as Heritage (Archaeology 105)

Popular Archaeology (Archaeology 107)

Human Biology and Evolution (Biological Sciences 275)

Contemporary European Society and Politics (History 283)

Human Growth and Development: Biological and Social-Psychological Considerations (Nutritional Sciences, and Human Development and Family Studies 347)

Social Indicators and Data Management in Poor Countries (Rural Sociology 213)

Subsistence Agriculture in Transition (Rural Sociology 357)

Cross-Cultural Psychology (Sociology 384 and Psychology 384)

Theories of Personality (Sociology 385 and Psychology 385)

IX. Graduate Seminars

600-level courses are open to undergraduates who have fulfilled the prerequisites or by consent of the instructor.

Southeast Asia Seminar: The Philippines (Asian Studies 601)

Southeast Asia Seminar: Islam in Southeast Asia (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 Spring. 4 credits.
F 2:30–4:25. J. T. Siegel
An examination of poststructuralist thought as it touches on anthropological concerns. Readings will be from Derrida and others.

[611 Principles of Social Anthropological Theory Spring. 4 credits. Not offered 1984–85.]

612 History of Anthropological Thought Spring. 4 credits.
W 1:30–3:30. A. T. Kirsch.
Readings in original sources of importance to the development of anthropological thought.

Methods of Assessing Physical Growth in Children (Nutritional Sciences 612)

[615 Doing Fieldwork Fall. 4 credits. Not offered 1984–85.]

[619 Anthropological Approaches to the Study of Buddhism in Asia Fall. 4 credits. Not offered 1984–85.]

[626 Problems in Economic Anthropology Spring. 4 credits. Not offered 1984–85.]

[627 Legal Anthropology Fall. 4 credits. Not offered 1984–85.]

[628 Political Anthropology (also Government 647) Spring. 4 credits. Not offered 1984–85.]

Anthropometric Assessment (Nutritional Sciences 630)

632 Andean Symbolism Fall. 4 credits.
Prerequisite: Reading knowledge of Spanish.
Hours to be arranged. B. J. Isbell.
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 1984–85.]

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.

[636 Cognition and Classification Spring. 4 credits. Not offered 1984–85.]

640–641 South Asia: Readings in Special Problems 640, fall; 641, spring. 4 credits.
Hours to be arranged. D. H. Holmberg, K. S. March.
Selected readings in society, religion, and culture in South Asia.

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 1984–85]

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.

656 Maya History Spring. 4 credits.
R 2:30–4:25. J. S. Henderson.
A detailed consideration of the dynastic history of the Classic Maya as it is recorded in hieroglyphic inscriptions and associated art. Emphasis is on the implications of these sources for reconstructing Maya social and political organization.

663 Problems in Archaeology: Early Man and the Origins of American Agriculture Fall. 4 credits. Prerequisites: Anthropology 356 or permission of instructor.
T 12:20–2:15. T. F. Lynch.
The transition for initial hunting and gathering adaptations to agricultural subsistence, with particular attention to human effects on the environment. The subject will be considered in historical perspective, as dealt with by archaeologists, botanists, ecologists, geographers, and geologists. Emphasis will be on the Andean zone and contextual analysis in archaeology.

[664 Problems in Archaeology: Early Man in America Spring. 4 credits. Not offered 1984–85.]

[666 The Discovery of America Fall. 4 credits. Not offered 1984–85.]

[667 Origins of Mesoamerican Civilization Spring. 4 credits. Not offered 1984–85.]

Human Evolution: Concepts, History, and Theory (Biological Sciences 673)

[677 Topics in Ecological Anthropology Fall. 4 credits. Not offered 1984–85.]

Introduction to Ethnomusicology (Music 680)

[681 Topics in Biomedical Anthropology Spring. 4 credits. Not offered 1984–85.]

Social Movements in Agrarian Societies (Rural Sociology 723)

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, pp. 180–181.

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

105 Archaeology as Heritage Fall and spring. 3 credits. Freshman Seminar.
T R 12:20–1:35. B. Lantz.
Our ideas about our cultural origins draw upon archaeological evidence and provide the impetus for archaeological research. Yet the relationship is not simple cause and effect: some evidence is more useful as heritage. This course examines New World cases of the selective invocation of past events as heritage: the role of the Aztec past in Mexico, the Inca heritage in Peru, the Colonial period in the United States, and the French tradition in Canada. Short essays and a longer research paper will allow students to explore the kinds of relationships we might have to the past as individuals, citizens, scholars, and patriots, as well as the kinds of sense we try to impose upon it as writers.

107 Popular Archaeology Fall and spring. 3 credits. Freshman Seminar.
M W F 1:25. Staff.
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.

[109 Archaeoastronomy Not offered 1984–85.]

[111 Indian Lifeways of Ancient North America Not offered 1984–85.]

[The Discovery of America (Anthropology 150) Not offered 1984–85.]

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) Spring.

B. Theory and Interdisciplinary Approaches

Note: For full descriptions of courses see the departments of origin.

[203 Early People: Human Cultural and Biological Evolution (also Anthropology 203) Fall. 3 credits. Not offered 1984–85.
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.]

[317 Method and Theory in Stone Age Archaeology Fall. 4 credits. Not offered 1984–85.
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) Spring. 4 credits.
T. F. Lynch.

[Ancient Societies (Anthropology 216) Fall. Not offered 1984–85.]

[The Earliest Civilizations (Anthropology 250) Not offered 1984–85]

[Interpretation of the Archaeological Record (Anthropology 352) Fall. Not offered 1984–85]

[Investigation of Andean Institutions: Archaeological Strategies (Anthropology 435) Not offered 1984–85]

Seminar in Archaeology: Ceramic Analysis (Anthropology 493) Fall. 4 credits.
J. S. Henderson.

[Seminar in Archaeology: Settlement Archaeology (Anthropology 494) Spring Not offered 1984–85]

Problems in Archaeology: Early Man and the Origins of American Agriculture (Anthropology 663) Fall. 4 credits.
T. F. Lynch.

[Problems in Archaeology: Early Man in America (Anthropology 664) Spring. Not offered 1984–85]

[Architectural Problems in Archaeological Fieldwork (Architecture 540) Not offered 1984–85]

Dendrochronology of the Aegean (Classics 309) Fall or spring. Variable to 4 credits.
P. I. Kuniholm.

Geomorphology (Geological Sciences 345) Spring. 4 credits.
A. L. Bloom.

[Ceramics (History of Art 423) Not offered 1984–85.]

C. Old World Archaeology

Note: For full descriptions of courses see the departments of origin.

[309 Archaeology of Africa: From Human Origins to Iron Age States Not offered 1984–85]

Introduction to Classical Archaeology (Classics 220 and History of Art 220) Spring. 3 credits.
J. E. Coleman.

Minoan-Mycenaean Art and Archaeology (Classics 221 and History of Art 221) Fall. 3 credits.
J. E. Coleman.

[Archaeology in Action I (Classics 232) Fall. Not offered 1984–85.]

Archaeology in Action II (Classics 233) Spring. 3 credits.
P. I. Kuniholm.

[Archaeology of Classical Greece (Classics 320 and History of Art 320) Not offered 1984–85]

[Archaeology of Cyprus (Classics 321 and History of Art 321) Not offered 1984–85]

[Greek Architecture (Classics 328) Not offered 1984–85]

[Greek Sculpture (Classics 329 and History of Art 329) Not offered 1984–85.]

Research Questions in Mediterranean Archaeology (Classics 450) Spring. 4 credits.
J. E. Coleman.

Seminar in Classical Archaeology (Classics 629) Fall. 4 credits.
Staff.

[Seminar in Classical Greek Archaeology (Classics 630) Not offered 1984–85.]

Arts of the Roman Empire (History of Art 322) Fall. 4 credits.
A. Ramage.

[Painting in the Greek and Roman World (History of Art 323 and Classics 323) Spring. Not offered 1984–85.]

Greek Vase Painting (History of Art 325) Spring 4 credits.
A. Ramage.

[Greek and Roman Coins (History of Art 327 and Classics 327) Fall. Not offered 1984–85]

[Art in Pompeii: Origins and Echoes (History of Art 330) Not offered 1984–85]

Seminar in Greek Sculpture (History of Art 431) Fall. 4 credits.
A. Ramage.

The History and Archaeology of Ancient Israel to 450 B.C.E. (Near Eastern Studies 243) Spring. 4 credits.
D. Owen.

[Interconnections in the Eastern Mediterranean World in Antiquity (Near Eastern Studies 361) Fall. Not offered 1984–85.]

[History and Archaeology of Ebla (Near Eastern Studies 362 and Archaeology 362) Spring. Not offered 1984–85]

[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) Not offered 1984–85]

[The History and Archaeology of the Ancient Near East (Near Eastern Studies 366 and Archaeology 310) Fall. Not offered 1984–85.]

[History and Archaeology of Ancient Egypt (Near Eastern Studies 367) Not offered 1984–85]

[Seminar in Syro-Palestinian Archaeology: The Israelite Conquest of Canaan (Near Eastern Studies 461) Not offered 1984–85.]

D. New World Archaeology

Note: For full descriptions of courses see the departments of origin.

361 Field Archaeology in South America (also Anthropology 361) Spring. 10 credits.
T. F. Lynch.

[The Peopling of America (Anthropology 354) Fall. Not offered 1984–85.]

Archaeology of Mexico and Central America (Anthropology 355) Spring 4 credits.
J. S. Henderson.

[The Archaeology of South America (Anthropology 356) Spring Not offered 1984–85; next offered 1985–86]

Mesoamerican Thought (Anthropology 456) Fall. 4 credits.
J. S. Henderson.

[Andean Systems of Production (Anthropology 630) Not offered 1984–85.]

[Andean Symbolism (Anthropology 632) Fall. Not offered 1984–85.]

[Andean Research (Anthropology 633) Not offered 1984–85]

Maya History (Anthropology 656) Spring. 4 credits.
J. S. Henderson.

[Origins of Mesoamerican Civilization (Anthropology 667) Not offered 1984–85]

E. Related Courses for Archaeology Majors

Note: For full descriptions of courses see the departments of origin.

Plane Surveying (Agricultural Engineering 221) Fall or spring.

Nature and Properties of Soils (Agronomy 260) Fall or spring.

Genesis, Classification, and Geography of Soils (Agronomy 361) Fall.

Geography and Appraisal of Soils of the Tropics (Agronomy 471) Spring.

[Use of Soil Information and Maps as Resource Inventories (Agronomy 506) Not offered 1984–85.]

American Indian Philosophies I: Power and World Views (Anthropology 242 and Rural Sociology 242) Fall.

American Indian Philosophies II: Native Voices (Anthropology 243 and Rural Sociology 243) Spring.

Ethnohistory of the Northern Iroquois (Anthropology 318 and Agriculture and Life Sciences 318) Spring.

[Ethnology of the Andean Region (Anthropology 333) Not offered 1984–85.]

[Ethnology of Oceania (Anthropology 336) Not offered 1984–85.]

[American Indian Tribal Governments (Anthropology 367 and Rural Sociology 367) Not offered 1984–85.]

[Indians of Mexico and Central America (Anthropology 432) Not offered 1984–85]

[Andean Thought and Culture (Anthropology 433) Not offered 1984–85.]

[American Indian Philosophies II: Selected Topics (Anthropology 442 and Rural Sociology 442) Not offered 1984–85.]

[Discovery of America (Anthropology 666) Not offered 1984–85.]

Introductory Photo I (Architecture 251 and Art 161) Fall.

Color Photo I (Architecture 350 and Art 263) Fall

Introductory Photo II (Architecture 351 and Art 261) Fall.

Problems in Contemporary Preservation Practice (Architecture 544) Fall or spring

Documentation for Preservation Planning (Architecture 546) Fall.

Remote Sensing: Environmental Applications (Civil and Environmental Engineering 611) Spring.

Image Analysis I: Landforms (Civil and Environmental Engineering 613) Fall.

The Greek Experience (Classics 211) Fall.

The Roman Experience (Classics 212) Spring

[The Individual and Society in Classical Athens (Classics 222) Not offered 1984–85.]

[Greek and Roman Mystery Religions (Classics 237) Not offered 1984–85.]

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) Fall.

Introductory Geological Science (Geological Sciences 101) Fall or spring.

Introduction to Historical Geology (Geological Sciences 102) Spring.

Structural Geology and Sedimentation (Geological Sciences 326) Spring.

Sedimentology and Stratigraphy (Geological Sciences 375) Fall.

[Glacial and Quaternary Geology (Geological Sciences 642) Not offered 1984–85.]

[Ancient Greece from Homer to Alexander (History 265) Fall. Not offered 1984–85.]

[The Greek City from Alexander to Augustus, 323 B.C.–A.D. 14 (History 373) Not offered 1984–85.]

Indochina and The Archipelago to the Fourteenth Century (History 395) Fall.

[The Tragedy of Classical Athens 479–399 B.C. (History 452) Not offered 1984–85.]

[The Crisis of the Greek City-State 415–336 B.C. (History 453) Not offered 1984–85.]

Introductory Statistics for the Social Sciences (Industrial and Labor Relations 510) Fall or spring

[Hittite (Linguistics 621–622) Not offered 1984–85.]

Elementary Statistics (Mathematics 372) Fall.

Statistics (Mathematics 472–473) 472, fall; 473 spring

[Ancient Near Eastern Literature (Near Eastern Studies 332) Not offered 1984–85.]

[Elementary Akkadian (Near Eastern Studies 333–334) Not offered 1984–85.]

[Readings in Akkadian (Near Eastern Studies 335) Not offered 1984–85.]

Readings in Akkadian: Huzi Dialect (Near Eastern Studies 336) Spring.

Asian Studies

C. A. Peterson, acting 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., B. deBary, 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, 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.

Distribution Requirement

Humanities: any two courses in Asian art, literature, or religion, at the 200 level or above, given by the Department of Asian Studies or cross-listed with Asian studies.

Social sciences: any two courses at the 200 level or above given by the Department of Asian Studies, or cross-listed with Asian studies, in anthropology, economics, government, linguistics, or sociology.

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.

Study Abroad

Cornell participates in the Inter-University Program in Chinese Language Studies in Taipei, which offers intensive training in advanced spoken and written Chinese. Cornell is also an affiliated institution of the Council on International Educational Exchange, which offers intensive language training at Beijing University and language and area studies at Nanjing and Fudan universities.

Freshman Seminars

101 Women and Social Transitions in the Twentieth Century Fall or spring. 3 credits.
M W F 1:25. C. Oshetsky.
The course will examine literary and autobiographical works written by women during periods of intense social transition in Asia, Europe, and America during the first half of the twentieth century. How have women's perceptions of their roles in marriage and the family, in society, and in history changed during periods of war, rapid industrialization, and revolution? What limitations have they experienced? How have they defined the tensions between feminism and more broadly defined movements for change such as socialism, trade unionism, and national liberation? Readings will include works by Han Suyin and Yuan-tsung Chen (China), Yosano Akiko and Ishimoto Shizue (Japan), Alexandra Koolontai (Soviet Union), Simone Weil and Simone de Beauvoir (France), and Emma Goldman and Agnes Smedley (U.S.A.).

[103 Revolutions and Social Values in Modern Chinese Literature Spring. 3 credits. Not offered 1984–85.
E. M. Gunn.]

[104 Three Ways of Thought Fall. 3 credits. Not offered 1984–85
T. L. Mei.]

[105 Feminine and Masculine Ideals in Japanese Culture (also Women's Studies 105) Spring. 3 credits. Not offered 1984–85.
K. Brazell.]

[106 Poetics for Physicists Fall. 3 credits. Not offered 1984–85.
B. deBary.]

[110 People and Nature in East Asia Fall. 3 credits. Not offered 1984–85.]

Related Freshman Seminars in Other Departments

History 192 Japan and the West 3 credits.
M W 1:25. V. Koschmann.

[History of Art 106 Art in a Landscape: The Traditional Arts of Southeast Asia Not offered 1984–85.]

General Education Courses

211 Introduction to Japan Fall. 3 credits.
M W 11:15; disc, F 9:05, 11:15, or 12:20.
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, that 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. (4 credits with a special project; consult instructor for information).
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.

215 Introduction to India, Nepal, and Sri Lanka Fall. 3–4 credits.
M W 11:15 plus discussion to be announced.
D. Holmberg.
A general introduction to the civilizations of South Asia designed for nonmajors. Faculty members from several departments will focus on intergrative themes in the study of South Asia: diversity, tradition, and change. The course will introduce the geography, prehistory, languages, cultures, arts, religions, history, politics, and contemporary developments of India, Nepal and Sri Lanka, drawing on the expertise of the Cornell faculty. In addition to lectures, the course will include several films.

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 Fall. 3 credits. Not offered 1984–85.
B. Faure.]

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 1984–85. *Section 2: Japanese Noh Theatre.* Not offered 1984–85.] *Section 3: Indonesian Dance Theatre. Section 4: topic to be announced.*
M W F 1:25. Staff.
Section 3: 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 Indonesian styles.
Section 4: topic to be announced.

[310 Readings in Korean Literature Fall. 3 credits. Not offered 1984–85.]

313 The Japanese Film Spring. 3 credits.
One optional film viewing M 4:30, one required viewing W 4:30; lec, W 7:30 p.m., R 9:05, or F 11:15 or 12:20. Staff.
After an introduction to methods of film analysis, the course presents a sequence of ten films by noted Japanese directors. The aim of the course is twofold: to enhance appreciation of film as an art form and to use the formal analysis of films to yield insights into Japanese society and culture. Particular attention is given to areas in which Japanese film, influenced by traditional arts and aesthetic principles, has resisted Hollywood editing and codes.

351 Indian 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 East Asian Buddhism Spring. 4 credits. No prerequisites; Asian Studies 250 or 351 strongly recommended. Not offered 1984–85.
B. Faure.]

355 Japanese Religions Fall. 4 credits.
T R 10:10–11:45. B. Faure.
A historical and phenomenological approach to the Japanese religious traditions with an emphasis on system of interaction, in order to attempt to establish the forms of the major forces that have shaped Japanese culture.

357 Chinese Religions Spring. 4 credits.
T R 2:30–3:45. B. Faure.
A survey of Chinese religious concepts and practices. Traditions of Confucianism, Taoism, and Buddhism, as well as folk religious practices, will be explored using historical and phenomenological approaches. Classical texts and scriptures in translation, lives of exemplary masters, and interrelationships of religion and culture.

371 Chinese Philosophical Literature 4 credits.
M W F 10:10. T. L. Mei.
Readings in English translation of Confucian, Taoist, and Buddhist works.

372 Chinese Poetry Spring. 4 credits.
M W 2:30–3:30. T. L. Mei.
A study of selected poets and dramatists in English translation. The course covers the *Book of Odes* and the *Songs of the South* of classical antiquity, the poetry of reclusion by T'ao Ch'ien and Han Shan, the golden age of T'ang poetry, and Yuan verse drama.

373 Twentieth-Century Chinese Literature Spring. 4 credits.
M W F 2:30. 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 4 credits. Not offered 1984–85.]

375 Japanese Poetry and Drama Spring 4 credits. Alternates with Asian Studies 377.
M W 2:30–4. K. Brazell.
A study of selected poets and dramatists in English translation. The course covers works from the eighth century Manyōshu through imperial anthologies, the poetry of Saigyō, noh plays, and haiku.

376 Modern Japanese Fiction Fall. 4 credits.
M W F 10:10. Staff.
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 1984–85.]

[379 Southeast Asian Literature in Translation Not offered 1984–85.]

[386 Folk Literature of East Asia Spring. 4 credits. Not offered 1984–85.]

388 Asian-American Literature Spring. 3 credits.
W 7:30 p.m. D. McCann.
A study of the Asian-American experience and identity, based on the writings of Frank Chin, Lawson Inada, John Okada, Richard Kim, and Maxine Hong Kingston. Class discussion of books assigned for reading and of biweekly papers written by the students.

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.

601 Southeast Asia Seminar Fall. 4 credits.
Topic to be announced. Contact the Southeast Asia Program, 120 Uris Hall, 256-2378, for further information.

602 Southeast Asia Seminar Spring. 4 credits.
Topic to be announced. Contact the Southeast Asia Program, 120 Uris Hall, 256-2378, for further information.

604 Southeast Asia Seminar (also International Agriculture 601, Philippine Agricultural Development)

607–608 The Plural Society Revisited (also Government 653–654) 607, fall; 608, spring. 4 credits. Only 607 may be taken independently for credit; 607 is a prerequisite for 608.
Hours to be announced. B. Anderson.
John Furnivall's concept, invented forty years ago, posited colonial society as one in which race (and ethnicity), class, occupation, and residence were distributed isomorphically. The seminar will review the utility of the concept in the light of subsequent research on colonial Southeast Asia and its applicability to developments since the achieving of independence. It will also consider the relevance of the concept to (uncolonized) Thailand. The core problematic will be the relationship between classification (naming) and power.

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), F 3:35; sec 2 (Japanese), F 1:25.
J. Cole.

650 Seminar on Asian Religions Spring. 2–4 credits. Prerequisite: permission of instructor.
W 2–4. 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 Departments

Urban Anthropology (Anthropology 313)

[Meaning across Cultures (Anthropology 320) Not offered 1984–85]

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 1984–85]

Politics in Contemporary Japan (Government 346)

[Politics of Industrial Societies (Government 348) Not offered 1984–85.]

[Political Role of the Military (Government 349) Not offered 1984–85]

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) Not offered 1984–85.]

Introduction to Art History: Asian Traditions (History of Art 280)

[Buddhist Art in Asia (History of Art 381) Not offered 1984–85.]

[Studies in Indian and Southeast Asian Art (History of Art 386) Not offered 1984–85.]

Ceramic Art of Asia (History of Art 482)

[Problems in Asian Art (History of Art 580) Not offered 1984–85.]

Related Courses in Other Colleges

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 1984–85.]

China—Area Courses

390 The Economies of China Fall. 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 1984–85.]

[Chinese Government and Politics (Government 347) Not offered 1984–85.]

Comparative Revolutions (Government 350)

[The Foreign Policy of China (Government 390) Not offered 1984–85.]

[Readings on the Great Cultural Revolution (Government 447) Not offered 1984–85]

[Chinese Political Readings (Government 448) Not offered 1984–85]

[Capitalism and Communism: Chinese and Japanese Patterns of Development (Government 462) Not offered 1984–85.]

[Politics of China (Government 645) Not offered 1984–85.]

[Readings from Mao Ze Dong (Government 651) Not offered 1984–85.]

[China and the West before Imperialism (History 193) Not offered 1984–85.]

Early Warfare, East and West (History 360)

[Art and Society in Modern China (History 390) Not offered 1984–85.]

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) Not offered 1984–85]

Chinese Historiography and Source Materials (History 691)

[Problems in Modern Chinese History (History 693–694) Not offered 1984–85]

[Seminar in Medieval Chinese History (History 791) Not offered 1984–85]

[Seminar in Modern Chinese History (History 793–794) Not offered 1984–85.]

Introduction to the Arts of China (History of Art 380)

[The Arts of Early China (History of Art 383) Not offered 1984–85.]

[Chinese Painting (History of Art 385) Not offered 1984–85.]

The Arts of Southeast Asia (History of Art 396)

[The Arts in Modern China (History of Art 481) Not offered 1984–85.]

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; Architecture 667–668; Government 347, 348, 350, 387, 440, 446, 606, and 645; History 190 and 192; History of Art 280, 381, 482, 580, and 596; Management NBA 586; and Sociology 342.

China—Language Courses

Basic Course (Chinese 101–102)

Cantonese Basic Course (Chinese 111–112)

FALCON (full-time course, Chinese 161–162)

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)

History of the Chinese Language (Chinese 401)

Linguistic Structure of Chinese: Phonology and Morphology (Chinese 403)

Linguistic Structure of Chinese: Syntax (Chinese 404)

Chinese Dialects (Chinese 405)

Readings in Modern Chinese (Chinese 411–412)

Chinese Reading Tutorials (Chinese 413–414)

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)

Readings in Folk Literature (Chinese 430)

Seminar in Chinese Poetry and Poetics (Chinese 603)

Seminar in Chinese Fiction (Chinese 605)

Seminar in Folk Literature (Chinese 609)

Advanced Directed Reading (Chinese 621–622)

Japan—Area Courses

391 The Japanese Economy Fall 4 credits. M W F 11:15. 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 1984–85.]

[Business and Labor in Politics (Government 334) Not offered 1984–85]

Politics in Contemporary Japan (Government 346)

[Politics of Productivity: Germany and Japan (Government 430) Not offered 1984–85.]

[Capitalism and Communism: Chinese and Japanese Patterns of Development (Government 462) Not offered 1984–85]

History of Japan to 1750 (History 397)

History of Modern Japan (History 398)

[Seminar in Tokugawa Thought and Culture (History 489) Not offered 1984–85.]

The Arts of Japan (History of Art 384)

Contemporary Japanese Society (Sociology 257)

Women in Japan and China (Sociology 342)

Family and Population (Sociology 442)

Other courses dealing extensively with Japan are Anthropology 313; Architecture 667–668; Education 678; Government 334, 348, 387, 446, 605, and 606; History 190 and 192; History of Art 280, 381, 482, 580, and 596; and Managmenet NBA 586.

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)

Transition to Intermediate Japanese Conversation (Japanese 223)

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 1984–85]

Architecture in Its Cultural Context (Architecture 667–668)

[Government and Politics of India (Government 300) Not offered 1984–85.]

India: Social and Economic Change in a Democratic Polity (Government 351)

[Studies in Indian and Southeast Asian Art (History of Art 386) Not offered 1984–85.]

Dravidian Structures (Linguistics 400)

Indo-Aryan Structures (Linguistics 442)

Elementary Pali (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; Agricultural Economics 464; Architecture 433; Asian Studies 250 and 351; Communication Arts 624 and 626; Government 387, 605, 606, and 687; History 190 and 191; History of Art 280, 386, 482, 580, and 596; 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 1984–85]

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 1984–85.]

Comparative Religious Systems (Anthropology 322)

Ethnology of Island Southeast Asia (Anthropology 334)

Ethnology of Mainland Southeast Asia (Anthropology 335)

Myth, Ritual, and Symbol (Anthropology 424)

Ritual Structures and Cultural Pluralism (Anthropology 425)

Anthropological Approaches to the Study of Buddhism in Asia (Anthropology 619)

Southeast Asia: Readings in Special Problems (Anthropology 634–635)

Political Anthropology: Indonesia (Anthropology 628 and Government 647)

Southeast Asia Seminar (Asian Studies 601) Fall. 4 credits.
Topic to be announced.

Southeast Asia Seminar (Asian Studies 602) Spring. 4 credits.
Topic to be announced.

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.

Southeast Asia Undergraduate Seminar (Government 300)

[Government and Politics of Southeast Asia (Government 344) Not offered 1984–85.]

The United States and Asia (Government 387)

[Political Anthropology: Indonesia (Government 647 and Anthropology 628) Not offered 1984–85.]

International Relations of Asia (Government 687)

[Introduction to Asian Civilization: Modern Period (History 191) Not offered 1984–85]

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)

Historiography of Southeast Asia (History 695–696) Spring.

Seminar in Southeast Asian History (History 795–796)

[Art in Landscape: The Traditional Arts of Southeast Asia (History of Art 106) Not offered 1984–85]

Introduction to Art History: Asian Traditions (History of Art 280)

[Buddhist Art in Asia (History of Art 381) Not offered 1984–85.]

[Studies in Indian and Southeast Asian Art (History of Art 386) Not offered 1984–85]

[Traditional Arts in Thailand (History of Art 388) Not offered 1984–85.]

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)

The Environment of International Business in Southeast and East Asia (Management NBA 586)

Introduction to World Musics (Music 103)

History, Theory, and Practice of Gamelan (Music 245–246)

Cornell Gamelan Ensemble (Music 445–446)

[Introduction to Enthnomusicology (Music 680) Not offered 1984–85]

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) Not offered 1984–85.]

[Social and Demographic Change in Southeast Asia (Sociology 439) Not offered 1984–85]

Other courses dealing with Southeast Asia are Agricultural Economics 660 and 701; Agricultural Engineering 771 and 774; Agronomy 401; Anthropology 420; Architecture 667–668; Asian Studies 250, 351, 352, and 650; Biological Sciences 679; Communication Arts 624; Education 782 and 783; Government 692; History 190; International Agriculture 601, 602, 603, 606, and 703; Management NBA 588; Nutritional Sciences 680 and 695; and Rural Sociology 430 and 754.

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)

Astronomy

Y. Terzian, chairman and director of undergraduate studies (428 Space Sciences Building, 256-4935); S. V. W. Beckwith, D. B. 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 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. No prerequisites.
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; rec, one hour alternate weeks. 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. No prerequisites.
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; rec, one hour alternate weeks. Exams may be given in the evening. R. Houck. 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. No prerequisites.
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. No prerequisites.
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 (also Arts and Sciences 200) 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; 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. Not offered 1984–85.]

332 Elements of Astrophysics Spring 4 credits. Prerequisites: calculus and 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. Distance, size, mass, and age of stars, galaxies, and the universe; stellar evolution and nucleosynthesis. Supernovae, pulsars, and black holes Galaxies and quasars. Introduction to cosmology 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. J Cordes, I. Wasserman.
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 M. Harwit, S. Beckwith
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. Not offered 1984–85]

[434 The Evolution of Planets Fall. 4 credits. Not offered 1984–85]

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—Solar System Exploration: *Voyager* Investigation of Uranus and Neptune Spring. 4 credits. Prerequisite: permission of instructor.
Hours to be arranged. J. Veverka.
Review of current observations and theoretical understanding of Uranus, Neptune, and their satellites. Discussion of the *Voyager 2* experiments and of the key questions that they will address when the spacecraft encounters Uranus in early 1986.

509 General Relativity (also Physics 553) Fall. 4 credits. Prerequisite: knowledge of special relativity at the level of, for example, *Classical Mechanics*, by Goldstein.
T 1:25–2:40 and R 2:30–4. S. Shapiro.
A systematic introduction to Einstein's theory, with emphasis on modern coordinate-free methods of computation. Topics include review of special relativity, modern differential geometry, foundations of general relativity, laws of physics in the presence of a gravitational field, experimental tests of gravitation theories. At the level of *Gravitation*, by Misner, Thorne, and Wheeler.

510 Applications of General Relativity (also Physics 554) Spring. 4 credits. Prerequisite: Astronomy 509.
T R 10:10–11:35. S. Shapiro.
A continuation of Astronomy 509 with emphasis on applications to astrophysics and cosmology. Topics include relativistic stars, gravitational collapse and black holes, gravitational waves, cosmology.

[**511 High-Energy Astrophysics** Spring 4 credits Not offered 1984–85.]

[**516 Galactic Structure and Stellar Dynamics** Spring. Not offered 1984–85.]

[**520 Radio and Radar Astronomy** Fall. Not offered 1984–85.]

[**521 Radio Astrophysics** Spring. Not offered 1984–85]

523 Signal Processing in Astronomy Spring 4 credits. Prerequisites: mathematical background equivalent to undergraduate physical science curriculum and familiarity with FORTRAN programming.
T R 2:30–4 J. Cordes, S. Ostro.
Topics will include Fourier analysis of discrete and continuous-time series, spectral analysis, statistical inference, parameter estimation, probability theory and stochastic processes with an orientation towards applications in observational radio astronomy and astrophysics. Discussion of applications such as interferometry, image processing, scintillation theory, planetary radar, and pulsar studies. Course work will include computer applications.

555 Theory of the Interstellar Medium (also Physics 665) Fall. 4 credits.
M W F 1:25–2:40. E. Salpeter, S. Beckwith.
Summary of observational data: theories of ionization and thermal equilibrium of the gas; grain formation and destruction; molecular cloud structure and star formation; interstellar effects of cosmic rays. Galactic dynamics.

[**560 Theory of Stellar Structure and Evolution (also Physics 667)** Fall. Not offered 1984–85]

[**570 Physics of the Planets** Fall. Not offered 1984–85.]

[**571 Mechanics of the Solar System (also Theoretical and Applied Mechanics 673)** Spring. Not offered 1984–85.]

575 Planetary Atmospheres Spring. 4 credits.
Hours to be arranged. P. Gierasch.
Introduction to radiative transfer. Scattering and line formation. Energy balance and thermal structure. Energy transport by motions; elements of circulation theory. Observations. At the level of *Radiative Transfer,* by Chandrasekhar.

579 Celestial Mechanics (also Theoretical and Applied Mechanics 672) Fall. 3 credits.
Two 1¼-hour lecs a week, hours to be arranged.
J. Burns.
Orbits: 2-body, 3-body, and n-body problems. Hill curves, libration points and stability, capture problems, virial theorem. Osculating elements. Pertubation equations: effects of gravitational potentials, atmospheric drag, and radiation forces on orbits. Secular pertubations, resonance problems.

590 Galaxies and the Universe Fall. 4 credits.
T R 2:30–3:45. M. Haynes.
The universe, its constituents, its large-scale structure, and its history, in the light of the major thrusts of extragalactic research. The morphology, photometry, dynamics, and kinematics of galaxies and their subsystems. Determination of masses, mass-to-light ratios, and the "missing mass." Activity in Seyferts, radio galaxies, and quasars. Binaries, groups, clusters, and superclusters. The extragalactic distance scale. Galaxy formation and evolution. Confrontation of cosomological theories with observational results.

[**620 Seminar: Advanced Radio Astronomy** Fall. Not offered 1984–85]

621 Seminar: Planetary Radar Astronomy Spring. 3 credits. Prerequisites: satisfactory completion of undergraduate mathematics and physics sequences for physical science–engineering majors, or permission of instructors.
Hours to be arranged. S. Ostro, T. Hagfors, D. Campbell.
Techniques of planetary radar astronomy, results of recent observations, and physical interpretation. Target detectability; the radar equation. Radar observables; delay and Doppler resolution. Instrumentation: antennas, receivers, transmitters, digital hardware. Signal processing and data analysis techniques. Target characterization: scattering laws and polarization properties. Delay-Doppler interferometry. Topographic mapping. Radar observations from orbit; bistatic measurements. Synthetic aperture radar. Satellite and STS systems for radar studies of Earth. Pioneer Venus and VRM. Ground-based results: Moon, Venus, Mercury, Mars, asteroids, comets, Galilean satellites, Saturn's rings.

[**633 Seminar: Advances in Infrared Astronomy** Spring. Not offered 1984–85.]

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 1984–85.]

671 Seminar: Asteroids and Meteorites Fall. 3 credits.
Hours to be arranged. J. Veverka.
Summary of current knowledge of asteroids and inferences about the parent bodies of meteorites. Interrelationship of comets and asteroids. Plans for direct exploration of asteroids and related small bodies by spacecraft.

671 Seminar: Special Topics in Planetary Sciences Spring. 2 credits.
Hours to be arranged. C. Sagan.

[**673 Seminar: Current Problems in Planetary Fluid Dynamics** Spring. Not offered 1984–85]

[**680 Seminar: Cosmic Rays and High-Energy Electromagnetic Radiation (also Physics 680)** Spring. Not offered 1984–85.]

[**699 Seminar: Computational Astrophysics** Fall. Not offered 1984–85]

Biological Sciences

G. W. G. Sharp, director (200 Stimson Hall, 256-2376); 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.

The program of study in biology at Cornell is offered by the Division of Biological Sciences to students enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences.

The biology major is designed to enable students to acquire necessary scientific foundations, to concentrate in a specific area of biology, and to obtain breadth by studying different aspects of modern biology. Areas of concentration include animal physiology and anatomy; biochemistry; botany; cell biology; ecology, systematics, and evolution; genetics and development; and 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 section in this catalog on the Division of Biological Sciences.

Burmese, Cambodian, and Cebuano (Bisayan)

See Modern Languages, Literatures, and Linguistics, p. 158.

Chemistry

R. Hoffmann, chairperson and director of undergraduate studies (124 Baker Laboratory, 256-4174); H. D. Abruña, 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, R. L. Houston, F. W. McLafferty, J. E. McMurry, J. Meinwald, G. H. Morrison, R. F. Porter, J. R. Rasmussen, H. A. Scheraga, M. Silvestri, 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, 218; or 122 plus 221, 222; or 192 plus 293, 294
3) Physics 208

Potential majors electing to take the mathematics sequence 214–218 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.
Lecs, 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 p.m. Oct. 4, Nov. 13, March 7, April 18. Fall: G. G. Hammes; 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. Not offered 1984–85.
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. Not offered 1984–85.
Lecs, 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. Not offered 1984–85.
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.]

205 The Art of Science: Relations between the Two Cultures Fall. 3 credits. S-U grades only.
Lec, T 2:30–4:30. J. C. G. Calado, R. Hoffmann.
This course will show how the arts and sciences have influenced one another throughout the ages, how beauty has permeated the framework of scientific theories, and how scientific ideas and technological advances have been incorporated by artists in their creative processes. Parallels will be drawn between some of the great breakthroughs in the physical sciences and similar inflections in the arts (chiefly in literature, painting, music, and photography). With the Newtonian era as a starting point, the course will focus on examples from the last three centuries up to the 1950s (postmodernism).

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 10:10–1:10; 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. 2, Nov. 6, March 5, April 16. Fall: B. Widom, J. R. Wiesenfeld; 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. 24, Oct. 23, Nov. 20, Feb. 21, March 19, April 25. 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. 9, Nov. 15. D. B. Collum.

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. M. Silvestri.
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. 24, Oct. 25, Nov. 20. M. Silvestri.
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. 24, Oct. 25, Nov. 27, Feb 21, Mar 28, May 2. Fall: G. S. Ezra; spring: G. Jursich.
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, R 1:25; lab, M or W 1:25–4:25. Prelims: 7:30–9 p.m., Oct. 2, Nov. 6. Fall, G. Jursich; 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. J. M. Burlitch.
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. Meinwald.
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, or T R 9:05–12:05 or 1:25–4:25. G. H. Morrison, T. A. McCarrick.
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 24 students. Prerequisites: Chemistry 302, 389, 390; coregistration in the latter is permissible.
Lecs, M W F 9:05; 2 labs, M W 1:25–4:25 or T R 8–11 or 1:25–4:25. H. D. Abruña.
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. J. E. McMurry.
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 with a grade of B or better, Chemistry 208 with a grade of A or better, or permission of instructor. Prerequisite for Chemistry 360: Chemistry 359. Recommended: coregistration in Chemistry 300–301–302.
Lecs, M W F 9:05; make-up lecs, W 7:30 p.m. Fall: C. F. Wilcox; spring: 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 p.m., Sept. 24, Oct. 23, Nov. 15, Dec. 6, Feb. 26, March 26, April 23. Fall: P. L. Houston; spring: J. R. Wiesenfeld.
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 1984–85.
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 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. Prerequisites: Chemistry 302 and 358 or 360 with a grade of B– or better or permission of instructor.
Selected faculty.
Research in organic chemistry involving both laboratory and library work, planned in consultation with a faculty member.

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.
R. Hoffmannn.
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. H. Morrison.
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*, Schonland'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.
The third of a three-term sequence. Introduction to ligand field theory and solid-state structure and properties, at the level of Figgis's *Introduction to Ligand Fields*. Kreb's *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. Not offered 1984–85.
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, F. W. McLafferty.
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 1984–85.
Lecs, T R 10:10; problem sessions and exams, T 7:30 p.m. F. W. McLafferty
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. Not offered 1984–85.
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.]

629 Electrochemistry Fall. 3 credits. Primarily for graduate students and upperclass undergraduates. Prerequisite: Chemistry 390 or equivalent (Mathematics 215 helpful).
Lecs, T R 8:30–10. H. Abruña.
Fundamentals and applications of electrochemistry. Topics will include the fundamentals of electrode kinetics, electron transfer theory, the electrical double layer, and diffusion. A wide range of techniques and their application as well as instrumental aspects will be covered.

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. J. Meinwald.
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, T R 8–9:30. B. Ganem.
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 design.

[668 Chemical Aspects of Biological Processes Fall. 4 credits. Prerequisites: Chemistry 358 or 360 and 390 or 288 or equivalents. Not offered 1984–85.
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. Not offered 1984–85.
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.
Lecs, M W 10–11:10. D. A. Usher.
Properties, synthesis, reactions, and biochemical reactions of nucleic acids.

[678 Thermodynamics Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 or equivalents. Not offered 1984–85.
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, 218, and Physics 208; or equivalents.
Lecs, M W F 10:10 and occasionally W 7:30 p.m. E. R. Grant.
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.
Lecs, 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. H. A. Scheraga, K. H. Theopold.

[716 Selected Topics in Advanced Inorganic Chemistry Fall. 3 credits. Prerequisite: Chemistry 390 or equivalent. Not offered 1984–85.
Lecs, 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.
Lecs, 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 1984–85.
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 1984–85.
Lecs, 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 1984–85.
Lecs, T R 12:20.
Particular attention is devoted to methods of structure determination and synthesis as applied to selected terpenes, steroids, alkaloids, and antibiotics.]

780 **Principles of Chemical Kinetics** Spring 4 credits. Prerequisite: Chemistry 681 or permission of instructor.
Lecs, 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 1984–85.
Lecs, 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. Not offered 1984–85.
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. Not offered 1984–85.
Lecs, 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 1984–85.
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. At the level of Child's *Molecular Collision Theory* and Taylor's *Scattering Theory.*]

793 **Quantum Mechanics I** Fall. 4 credits. Prerequisites: Chemistry 681, coregistration in Mathematics 421, and Physics 431 or equivalents or permission of instructor.
Lecs, T R 8:40–9:55. A. C. Albrecht.
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.
Lecs, 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 Weissbluth's *Atoms and Molecules.*

796 **Statistical Mechanics (also Physics 562)** Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 793 or equivalent.
Lecs, T R 8:30–9:55. B. Widom.
Ensembles and partition functions; fluctuations. Thermodynamic properties of ideal gases and crystals; Third Law; chemical equilibria. Imperfect gases; correlations functions; liquids. Phase transitions; Ising-models and lattice gases. Ideal quantal gases; Bose-Einstein condensation. At the level of McQuarrie's *Statistical Mechanics.*

[798 **Selected Topics in Physical Chemistry** Spring. 3 credits.
Lecs, T R S 9:05. Not offered 1984–85.]

Chinese

See Department of Asian Studies, pp. 111–112, and Modern Languages, Literatures, and Linguistics, pp. 158–159.

Classics

P. Pucci, chairman; L. S. Abel, F. M. Ahl, K. Clinton, J. E. Coleman, M. L. Cook, J. R. Ginsburg (on leave 1984–85), I. M. Hohendahl, G. M. Kirkwood (emeritus), N. Krevans, P. I. Kuniholm, G. M. Messing (graduate faculty representative), P. T. Mitsis, (director of undergraduate studies, 256-3354), C. Newlands, W. Wetherbee

Sir Kenneth Dover, A. D. White Professor-at-Large; A. L. Ford, Mellon Fellow; C. Newlands, James Hutton Instructor; M. C. J. Putnam, Townsend Lecturer

Cornell University has long recognized the importance of studying civilizations of ancient Greece and Rome. Especially in an age of increasing specialization, study of the Classics is widely viewed as an excellent means of acquiring a liberal education; at Cornell, we are deeply interested in the continuing humanistic values contained in the literature of the ancient world and in gaining a fuller understanding of these important cultures and their imprint upon subsequent ages.

The Department of Classics at Cornell is one of the oldest and largest in the country. With fourteen faculty members, together with professors of related interests in the Departments of History, Philosophy, Comparative Literature, History of Art, Architecture, Modern Languages and Linguistics, and Near Eastern Studies, the range of opportunities for study is very large, including not only the traditional study of language, literature, and ancient history, but also newer developments in the field, such as comparative study of Mediterranean civilizations and modern literary theory.

Although Classics, like other areas of humanistic study, does not aim at providing specific preprofessional training, over the years Classics majors from Cornell have gone on to a wide variety of careers: in law, teaching, medicine, archaeology, diplomacy, management, educational administration, government, and many others.

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) 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. The chairperson will appoint the committee for each candidate and it will be responsible for supervising and evaluating the work of the candidate. At the completion of the honors thesis, which must show the capacity of the candidate to do research, to demonstrate knowledge of the main bibliographical sources, and to give promise of scholarly aptitude, the committee will determine the level of honors to be awarded.

Study Abroad

Cornell participates in the Intercollegiate Center for Classical Studies in Rome, which offers courses in Latin, Greek, ancient history, art, archaeology, and Italian. 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. For both, undergraduate and graduate students the Department of Classics offers a few travel grants each year from the Townsend Memorial Fund. Detailed information on these programs is available in the Department of Classics Office, 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.
M W F 9:05. 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 1984–85.
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: Love and Chastity Fall. 3 credits.
M W F 11:15. C. Newlands.
This course will examine different attitudes towards love throughout the Roman period. Particular topics will include the influence of politics, philosophy, and religion upon the concept of love, as well as the varying role of women as wives, prostitutes, mistresses, and goddesses. Readings will range from Terence's *Eunuch* to Augustine's *Confessions*.

121 Freshman Seminar in Classical Archaeology Fall or spring. 3 credits.
Staff.
Archeological research illuminates both the great achievements and the daily lives of the ancient Greeks and Romans. This course will focus on one or two of the major Mediterranean civilizations and will consider the methods, history, and results of archaeological research through the examination of a number of specific topics. Such topics may include the Minoan and Mycenaean civilizations; the rediscovery of ancient Troy by Schliemann and its implications for our understanding of Homer; the archaeological bases of Greek myths; the development of the Greek and Roman alphabets; Greek and Roman architecture, sculpture, and painting; burial practices and ancient views about death; and archaeological evidence for the family in antiquity.

150 Freshman Seminar in Greek and Roman Myths Fall or spring. 3 credits.
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.

[200 Mediterranean Archaeology (also Near Eastern Studies 280) Fall. 3 credits. Not offered 1984–85.
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. F. Ahl.
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. Staff.
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 or 265, or 266 or permission of instructor. Not offered 1984–85.
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 1984–85.
An introduction to the pre-Socratic philosophers and Plato]

[225 Hellenistic and Roman Philosophy Spring 3 credits. Not offered 1984–85.
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. S. Rogers.
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 1984–85.
M W F 11:15. K. Clinton.
The development and character of Mystery cults from the original Mysteria of Demeter and Persephone to the Christian Mysteries. The cults include the Kabiroi, 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 Fall. 3 credits.
M W F 10:10. 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 1984–85.
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 that they relate]

[300 Greek and Roman Drama (also Comparative Literature 300) Spring. 4 credits. Not offered 1984–85.
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 1984–85.]

[336 Foundations of Western Thought (also Comparative Literature 336) Fall. 4 credits. Not offered 1984–85.
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 how is scientific thinking distinguished from 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 1984–85.
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 1984–85.
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: one of the following: survey of Greek history, a course in Greek civilization, ability to read Greek, or permission of instructor.
T 12:20–2:15, R 12:20–1:10. 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 1984–85.
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. Staff.

[610 Language of Myth (also Anthropology 610) Spring 4 credits. Not offered 1984–85.
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 1984–85.]

711–712 Independent Study for Graduate Students in Classical Civilization 711, fall; 712, spring. Up to 4 credits.
Hours to be arranged. Staff.

Greek

101 Greek for Beginners Fall or spring. 4 credits.
Fall: M T W F 12:20, K. Clinton. Spring: M T W F 11:15, M. Cook.
Introduction to Attic Greek. Designed to enable the student to read the ancient authors as soon as possible

103 Attic Greek Fall or spring. 4 credits. Prerequisite: Classics 101 or equivalent.
Fall: M T W F 12:20, M. Cook. Spring: M T W F 12:20, K. Clinton.
A continuation of Classics 101.

[111–112 Modern Greek 111, fall; 112, spring 3 credits. Not offered 1984–85.
M W F 9:05. G. M. Messing.]

201 Attic Authors Fall. 3 credits. Prerequisite: Classics 103 or equivalent.
M W F 1:25. N. Krevans.
Selected readings from Plato, Thucydides, and Euripides.

203 Homer Spring. 3 credits. Prerequisite: Classics 103 or equivalent.
M W F 9:05. P. Pucci.
Readings in the Homeric epic.

[204 Plato Spring. 3 credits. Prerequisite: Classics 103 or equivalent. Not offered 1984–85.
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. Staff.

301 Greek Historians Fall. 4 credits. Prerequisite Classics 203 or 204 or equivalent.
M W F 1:25. M. Cook.
Topic varies. Most recently 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 1984–85.
G. M. Kirkwood.]

[303 Readings in Greek Rhetoric Fall. 4 credits. Not offered 1984–85.
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. Not offered 1984–85.
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 1984–85.]

307 Plato Fall. 4 credits. Prerequisite: Classics 203 or 204 or equivalent.
M W F 2:30. P. Mitsis.
Plato on egoism, love, and friendship: *Lysis* and *Symposium*.

[308 New Testament Greek Spring. 4 credits. Not offered 1984–85.
M W F 9:05. P. Mitsis.
The career and writings of St. Paul. The course will focus on Paul's contribution to such central theological concerns of Western Christianity as the transcendence of God, christology, grace and free will, etc. In addition, we will examine Paul's role in the growth and development of early Christianity; his relation to Greek thought, Hellenistic Judaism, and Hellenistic Christianity; the literary form of the epistle; etc. Readings in Greek augmented by representative examples of recent New Testament criticism.]

[310 Greek Undergraduate Seminar Fall or spring. 4 credits. Prerequisite: two terms of 200-level Greek or permission of instructor. Not offered 1984–85.]

340 Ancient Greek Constitutions Spring. 3 or 4 credits. Prerequisite: at least one of the following: survey of Greek history, a course in Greek civilization, ability to read Greek, or permission of instructor.
T 12:20–2:15, R 12:20–1:10. 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. Staff.

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.
T R 12:20–1:45. A. Ford.
A reading of Aristotle's *Poetics* and related texts. An explication of the argument in relation to Greek ideas about poetry.

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.
T R 10:10–11:35. Staff.

[419 Advanced Greek Composition Fall. 2 credits. Prerequisite: Classics 209–210 or equivalent. Not offered 1984–85.]

[442 Greek Philosophy Fall or spring. 4 credits. Not offered 1984–85.]

671 Seminar in Greek: Graduate Fall. 4 credits.
T 1:25–4:25. P. Pucci.
Odysseus in archaic Greek epic. Analysis of the Odyssean and Iliadic features of Odysseus in the *Iliad* and scrutiny of the characterization of Odysseus in the *Odyssey*.

672 Seminar in Greek: Graduate Spring 4 credits.
R 1:25–4:25. K. Clinton.

701–702 Independent Study for Graduate Students in Greek 701, fall; 702, spring. Up to 4 credits.
Hours to be arranged. Staff.

Latin

105 Latin for Beginners Fall or spring. 4 credits.
Fall: M T W F 8, staff; M T W F 2:30, staff; M T W F 1:25, C. Newlands. Spring: M T W F 8, staff.
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, 10:10, or 1:25; staff
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. J. Rogers.

205 Intermediate Latin Fall. 3 credits. Prerequisite: Classics 106 or 108 or placement by departmental examination.
M W F 10:10, P. Mitsis; M W F 1:25, P. Mitsis.
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. N. Krevans.
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 1984–85.]

216 Vergil Spring. 3 credits. Prerequisite: one term of 200-level Latin.
M W F 11:15. N. Krevans.
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.
W F 2:30. F. Ahl.

242 Latin Composition Spring. 2 credits. Prerequisite: Classics 241 or equivalent.
Staff.

[312 Latin Undergraduate Seminar Fall or spring 4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor. Not offered 1984–85.]

314 The Augustan Age Fall. 4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor.
M W F 10:10. N. Krevans.
The poetry of Horace, Vergil, and Propertius, with special emphasis on the *Eclogues*, the *Odes*, and the *Monobiblos* as examples of Augustan poetry books.

315 Roman Satire Spring. 4 credits. Prerequisite: two terms of 200-level Latin.
C. Newlands.

[316 Roman Philosophical Writers Fall. 4 credits. Prerequisite: two terms of 200-level Latin. Not offered 1984–85.
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 instructor. Not offered 1984–85.
M W F 1:25. J. 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. Not offered 1984–85.
M W F 11:15. Staff.]

[366 Late Latin Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1984–85]

368 Medieval Latin Literature Fall 4 credits. Prerequisite: Classics 214 or permission of instructor.
T R 2:30–3:45. W. Wetherbee.
Medieval Latin texts and their historical and cultural contexts are closely studied.

[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. Not offered 1984–85.
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. Staff.

[460 The Latin Poems of Milton Fall. 4 credits. Prerequisite: two semesters of 300-level Latin. Not offered 1984–85]

679 Seminar in Latin (Seneca): Graduate Fall 4 credits.
M 1:25–4:25. F. Ahl.

680 Seminar in Latin: Graduate Spring. 4 credits.
T 1:25–4:25. Staff.
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. Staff.

Classical Archaeology

220 Introduction to Classical Archaeology (also History of Art 220) Spring. 3 credits.
M W F 10:10. J. Coleman and teaching assistant.
The archaeology of the ancient Greeks and Romans as seen from a critical perspective. Major developments in Classical archaeology will be traced from treasure hunting to modern scientific research. Examples illustrating various approaches will be chosen: the sculpture, vase painting, and architecture of the ancient Greeks from the Geometric period through the Hellenistic, and the art of the Romans from the early Republic to the late Empire.

221 Minoan-Mycenaean Art and Archaeology (also History of Art 221) Fall. 3 credits.
M W F 10:10. J. Coleman.
The birth of civilization in Greece and the Aegean islands during the Bronze Age. The main focus is on the rise and fall of Minoan Crete and Mycenaean Greece, with consideration given to the nature and significance of Aegean interactions with Egypt, the Near East, and Anatolia. Topics also include Cyprus as an intermediary between the Aegean and the eastern Mediterranean, the effects of the volcanic eruptions of Santorini-Thera, and the evidence of Homer and the Greek myths.

[232]–233 Archaeology in Action I and II [232, not offered fall 1984]; 233, spring. 3 credits each term. Prerequisites: Archaeology 100 or Classics 220, and permission of 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. 4 credits. Limited to 10 students. Prerequisite: Archaeology 100 or Classics 220, and permission of instructor.
M 12:20–2:15; 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 1984–85.]

[321 Archaeology of Cyprus (also History of Art 321) Spring. 4 credits. Prerequisite: Classics 220 or permission of instructor. Not offered 1984–85.
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 or 221, or permission of instructor. Not offered 1984–85.
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. Not offered 1984–85.
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) Spring. 4 credits.
M W F 11:15. A. Ramage.
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 1984–85.
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. Not offered 1984–85.
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.]

[328 Greek Architecture (also History of Art 328) Fall. 4 credits. Prerequisite: Classics 220 or permission of instructor. Not offered 1984–85.]

[329 Greek Sculpture (also History of Art 329) Fall. 4 credits. Not offered 1984–85.
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 1984–85.
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) Fall. 4 credits.
M W F 11:15. A. Ramage.
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 1984–85.
W 2:30–4:30. A. Ramage.]

431 Greek Sculpture (also History of Art 431) Fall. 4 credits.
T 2:30–4:30. A. Ramage.
Study of ancient Greek sculpture techniques and achievements in marble and bronze. Detailed examination of a selection of works to illustrate sculptural development. What we know of the Greeks' own theories will be a main theme.

450 Research Questions in Mediterranean Archaeology Spring. 4 credits. Prerequisite: at least one course in archaeology.
M W F 2:30. J. Coleman.
A consideration of some of the important questions in the archaeology of early southeastern Europe, Greece, and the eastern Mediterranean and the techniques and strategies currently used to answer them. The questions are concerned both with field methods and the further interpretation of archaeological artifacts. Although the focus of the course may change somewhat from year to year, the questions to be considered will include some of the following: the use of computers in archaeological recording and interpretation; chronology, particularly radiocarbon dating and its dendrochonological calibration; environmental change, including climate and the relative rise of sea level; strategies for excavation and surface survey, particularly in the Aegean and Cyprus; the early use of metals, especially copper mining and metallurgy in Europe, Greece, and Cyprus; neutron activation and other scientific analyses of pottery, particularly as concerns the export and imitation of Mycenaean ware; and, in a more general way, the interpretation of the evidence for early trade, particularly between Greece, Anatolia, and the eastern Mediterranean. Students will present two papers, one of which shall involve work with practical data. Material from the Cornell collections and from the excavations at Alambra, in Cyprus, will be available for study. Three classes per week, one of which will be devoted to practical work and student papers.

629 Seminar in Classical Archaeology Fall. 4 credits.
W 1:25–4:25. J. Coleman.
The archaeology and art of the Cycladic islands in the Bronze Age. Subjects covered will include the nature and meaning of Early Cycladic sculpture; the historical and artistic significance of Thera in the Middle and Late Bronze Age; the interactions between the islands, Crete, and the mainland; and the importance of metals to the economy of the Cyclades.

[630 Seminar in Classical Greek Archaeology: Graduate Spring. 4 credits. Not offered 1984–85.]

Classical Linguistics

[420 History of the Greek Language Fall. 3 credits. Not offered 1984–85
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 1984–85.
G. M. Messing.]

423 Vulgar Latin Fall. 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 1984–85.]

[425 Greek Dialects Fall. 4 credits. Not offered 1984–85.
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

The Ideology of Imperialism: The Augustan Age in Rome and England (Society for the Humanities 415–416) 415, fall; 416, spring.
L. Brown.

Pedagogy and the Nineteenth-Century Novel (Society for the Humanities 418) Spring.
P. Carden.

Napoleonic Town Planning (Society for the Humanities 423–424) 423, fall; 424, spring
R. Becherer.

The Interaction of Classical and Non-Classical Elements in the Tragedie-Lyrique (Society for the Humanities 429) Fall.
L. Rosow.

Classicism in Early American Poetry: Adam and Aeneas (1516–1750) (Society for the Humanities 431) Fall.
J. Shields.

Classicism in Early American Poetry: Adam Becomes Aeneas (1750–1800) (Society for the Humanities 432) Spring.
J. Shields.

Related Courses in Other Departments

Comparative Literature

Great Books (Comparative Literature 201–202)

History of Literary Theory (Comparative Literature 403/603)

The Hermeneutic Tradition (Comparative Literature 699)

Philosophy

Ancient Thought (Philosophy 210)

Topics in Ancient Philosophy (Philosophy 314)

Ancient Philosophy (Philosophy 611)

Comparative Literature

A. Caputi, chairman (244 Goldwin Smith Hall, 256-4155); C. Arroyo, J. Boon, C. Carmichael, W. Cohen, J. Culler, G. Gibian, D. Grossvogel, P. Hohendahl, W. Holdheim, W. J. Kennedy, director of undergraduate studies (163 Goldwin Smith Hall, 256-3398), J. Monroe, E. Rosenberg, E. Santí, L. Waugh

Also cooperating: J. P. Bishop, K. Brazell, P. Carden, C. Chase, S. L. Gilman, A. V. Grossvogel, M. Hays, C. Kaske, R. E. Kaske, C. Lazzaro, J. Najemy, S. Williams

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 pp. 213–214.

Courses

201–202 Great Books 201, fall; 202, spring. 4 credits. Comparative Literature 201 and 202 may be taken independently of each other.
Fall: T R 10:10–11:25; sec 1, T 12:20; sec 2, W 1:25; sec 3, W 2:30; W. Cohen. Spring: M W F 10:10, W. Kennedy.
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 the Bible, Homer, Plato, Vergil, Dante, Shakespeare, and others. 202: selections from Voltaire, Goethe, Nietzsche, Ibsen, Pirandello, Joyce, and others.

236 Greek Mythology (also Classics 236) Fall. 3 credits.
T R 8:40–9:55. Staff.
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.

309 Mystery and the Mystery Story (also French 309) Fall. 4 credits.
M W F 10:10. D. Grossvogel.
Why do we read mystery novels? Are they really concerned with mystery? Are they fit material for an academic curriculum? These and other questions will be raised through the reading of certain writers of mystery stories like Agatha Christie and Georges Simenon, as well as through that of others like Borges and Kafka, who wrote tales of detection that secrete an entirely different kind of mystery.

[312 Comedy Not offered 1984–85.
W. J. Kennedy.]

314 The Novella in World Literature Spring 4 credits.
T R 2:30–3:45. W. W. Holdheim.
The art of the novella from Boccaccio to modern times. Readings will include works of Cervantes, Hoffmann, Kleist, Melville, James, Gogol, Pushkin, Merimee, and Maupassant. The theory of the novella and the genre's relation to other short narrative forms will be discussed.

315 Rhetoric and Technology Fall. 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, Joyce, and 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 Not offered 1984–85
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*]

345 Dante and Medieval Culture (also Italian 344) Fall. 4 credits.
T R 12:20–1:35. P. D'Acierno.
A close reading of the *Divine Comedy* with special attention to Dante's affiliations with the textual and interpretive tradition and the modes of thought in medieval culture. Course given in English; an extra meeting will be offered for students who wish to use Italian.

[352 Classic and Renaissance Drama (also Theatre Arts 325) Not offered 1984–85
A. Caputi.]

353 European Drama, 1660 to 1900 (also Theatre Arts 326) Spring. 4 credits.
T R 10:10–11:25. S. Williams.
Readings from major dramatists from Corneille to Chekhov, including such authors as Moliere, Congreve, Marivaux, Goldoni, Gozzi, Schiller, Kleist, Gogol, Ostrovski and Ibsen.

354 Modern Drama (also Theatre Arts 327) Fall. 4 credits.
T R 2:30–3:45. M. Hays.
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.

361 Introduction to the Culture of the Early Renaissance (also History 361 and History of Art 350) Fall. 4 credits. No prerequisites.
T R 1:25–2:15; disc to be arranged. C. Lazzaro, J. Najemy, with some lectures by W. Kennedy, E. Morris.
Renaissance culture is introduced through six major figures: Petrarch, Alberti, Machiavelli, Leonardo, Erasmus, and Rabelais. Each figure will be the focal point for the critical examination of problematic issues in the areas of humanism, religious and political thought, literature, art, and architecture. In the discussion sections, problems of interpretation will be approached through the analysis of primary source readings and works of art.

362 Introduction to the Culture of the Later Renaissance (also History 364 and History of Art 351) Spring. 4 credits.
T R 1:25–2:15; disc, F 1:25 or 2:30. E. G. Dotson, C. Kaske, with some lectures by C. Arroyo, C. Holmes, J. Najemy, E. Morris.
Although Comparative Literature 361 (also History 361 and History of Art 350) is not a prerequisite, this course is a continuation of it in that it is similarly organized and deals with the period immediately succeeding. Members of several departments will lecture on Luther, Michelangelo, Durer, Montaigne, Edmund Spenser, Bodin, and Cervantes. Close reading of texts, literary and visual; discussion will include methods of interpretation and historical analysis.

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 12:20–1:35, W. W. Holdheim. Spring: T R 12:20–1:35, E. Rosenberg.
Close reading of English and Continental novels from 1600 to 1950. 363: Cervantes to Dostoevsky. 364: Tolstoy to Gide. The novelists to be studied include Voltaire, Scott, Stendhal, Balzac, Goethe, Flaubert, Hardy, Mann, and Nabokov. Analysis of novelistic subgenres: picaresque fiction, historical novel, moral fable, *récit*, detective story, and *Bildungsroman*.

370 Poetry of the Late Eighteenth and Nineteenth Century Fall. 4 credits.
M W F 1:25. J. Monroe.
A study chiefly of German classicism (Goethe, Schiller, Hölderlin), English and American romanticism (Wordsworth, Coleridge, Shelley, Whitman), and French symbolism (Baudelaire, Rimbaud, Mallarme), with attention to problems of literary classification and periodization. Foreign language texts may be read in translation.

371 Twentieth-Century Poetry Spring. 4 credits.
M W F 11:15. J. Monroe.
Close readings of major German, French, and American poets in relation to prominent movements in their respective national literary traditions: expressionism (Benn, Trakl, Rilke), surrealism (Valery, Apollinaire, Breton), and imagism (Pound, Eliot, Williams). Foreign language texts may be read in translation.

381 Marxist Cultural Theory (also German 381) Fall. 4 credits.
T R 2:30–3:45. W. Cohen, P. Hohendahl.
A historical survey of leading European Marxist thinkers, offering a critical perspective on culture, particularly in relation to ideology. Mainly a close reading of selected texts but with consideration of historical contexts as well. Some emphasis on aesthetics and especially literary theory. Readings from Marx, Engels, Lukacs, Gramsci, Brecht, Benjamin, Horkheimer, Adorno, Marcuse, Sartre, Althusser, and Williams.

390 The Power of Nationalism: Expressions of National Feelings in Politics, Science, Literature, and the Arts (also Russian 390) Fall. 4 credits.
W 2:30–4:30. G. Gibian and others.
The seminar will deal with various aspects of the general subject of national feeling. In addition to studying the political phenomenon of nationalism, we shall also study the roles played by national awareness in the perception of one's identity, images of national character, stereotypes of national qualities, and the relation between a sense of belonging to a nation and various other groups. Solzhenitsyn; other Russian literary expressions of national feeling. American nationalism; black American, Israel, and Germany as case studies; national features in music.

394 Vico and Gramsci and the Development of Modern Italian Thought (also Italian 394) Fall. 4 credits.
W 2:30–4:25. P. D'Acierno.
Close readings of Vico's *New Science* and Gramsci's *Prison Notebooks* with emphasis on the implications of these texts for contemporary literary and hermeneutic theory. An attempt will also be made to examine the relations of these two thinkers to various Italian and European intellectual traditions. Such problems as the role of theory in the human sciences, the elaboration of an interpretative theory of culture, and the methodology of the philosophy of history will be examined.

399 Forms of Opposition: German Women Writers on the Nazi Period (also German Literature 399) Spring. 4 credits.
T R 12:20–1:35. C. A. Martin.
A study of women's writing on the Nazi period, with an emphasis on the impact of divergent

developments in the two postwar German states on historical memory. This course will pay particular attention to the choices and effects of different literary forms and languages. Readings will include, but not be limited to, texts by Anna Seghers, Elisabeth Langgasser, Luise Rinser, and Christa Wolf.

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.

403 History of Literary Theory (also Comparative Literature 603) Fall. 4 credits.
M 3:30–5:30. W. J. Kennedy.
A survey of European literary theory since Aristotle. Emphasis on major texts and on the main contours of the history of literary theory. Some consideration of literary criticism as ideology, in relation to literature, philosophy, and social history. Readings from Longinus, Nietzsche, the Russian formalists, Barthes, and others.

409 Freud as Imaginative Writer and Reader (also English 409) Spring. 4 credits. Limited to 15 students. Open to all students who have taken at least one literature course at the 200 level or above.
T R 2:30–3:45. C. Chase.
This course will introduce Freud as an imaginative writer and a reader of imaginative writing—the source of psychoanalytic criticism. Texts will include works by Freud, Shakespeare, Sophocles, and E. T. A. Hoffmann. No previous familiarity with Freud's writings or with psychoanalytic theory is necessary.

418 Pedagogy and the Nineteenth-Century Novel (also Society for the Humanities 418 and Russian Literature 418) Spring. 4 credits.
M 2:30–4:30 plus 1 hour to be arranged.
P. Carden.
Platonic thought affiliates basic philosophical questions to pedagogy. How do we know? How do we learn? What education will produce worthy citizens and rulers? Rousseau in his *Emile* took up the high philosophical tradition of pedagogy and recast it as a myth and as an incipient novel.In so doing he opened the way to what we can call the great pedagogical novels of the nineteenth century. In this seminar we will examine the principles of a pedagogy designed to encompass the whole of life, as it is set forth in such works of Plato as *Meno, Phaedo, Symposium* and *Republic* and as it is reintroduced into the mainstream of philosophical thought by Rousseau's *Emile* and Schiller's *Letters on Aesthetic Education*. Then we will turn to several novels of the nineteenth century, among them Tolstoy's *War and Peace*, Dostoevsky's *Notes from the Underground*, and Flaubert's *A Sentimental Education*, to see how the presumptions of a philosophical pedagogy rooted in Platonic thought were tested by authors who found in the novel a vehicle for philosophical and pedagogical myths or for their debunking.

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.
The Book of Genesis.

426 Seminar on Biblical Law Spring. 4 credits. Limited to 20 students.
T 2:30–4:25. C. M. Carmichael.
Analysis of biblical legal material in its literary and historical context.

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 1984 will be on Mark and John. 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.

448–449 Nature in Literature and Art 448, fall; 449, spring. 4 credits.
T R 12:20–1:35. A. B. Fernandez.
A survey of the presentation of nature in Western literature and art, with reference to developments in philosophy, science, and politics. The course will range from pre-Homeric sources to science fiction, and one of its aims will be to identify recurring forms of imaginative interpretation of nature. Among the texts and works of art that will be studied during the first semester are Ikhnaton's sun hymn and Old Testament psalms; Virgilian and Renaissance eclogues; landscape paintings from the Van Eycks to Poussin; neoclassical and romantic nature poems; and selections from Cervantes, Fielding, and Fenimore Cooper. Major topics of the second semester: the interiorization of landscape in poetry from Coleridge to Rimbaud; landscape art from Turner to Ernst; nature in the fiction of Hardy, Conrad, and Sartre.

480 Stendhal, Balzac, Flaubert Spring. 4 credits.
T R 10:10–11:25. J. Culler.
A study of *Le Rouge et le Noir, La Chartreuse de Parme, Illusions perdues, La Cousine Bette, Madame Bovary,* and *L'Education sentimentale*. Analysis of theme and structure; discussion of narrative technique and of problems in the theory of fiction as they pertain to these novels. The course will be conducted in English, but a good reading knowledge of French is required.

485 Difference Spring. 4 credits. Open to undergraduates and graduate students.
W 2:30–4:30. S. Gilman.
How do writers create the idea of difference? This seminar will explore the rhetoric of difference, the difference ascribed to gender, race, and sexual preference, as mirrored in literary texts and the "scientific" discourse about difference. Among the readings will be Eliot's *Daniel Deronda*, read parallel to Renan and Gobineau on race; Zola's *Nana*, read parallel to Parent-Duchatelet, Acton, and Lombroso on female sexuality; Wedekind's *Lulu* dramas, read parallel to Krafft-Ebing and Hirschfeld on gender preference. Among the other related images of difference that will be discussed in the class will be madness as the icon of difference, blackness as the sign of pathology, and the special nature of the language of difference. Theoretical readings will be from the works of Freud, Rank, Lakof, and Johnson and Susan Sontag. All readings in English.

492 The Modernist Poetic Sequence Spring. 4 credits.
W 2:30–4:25. J. Monroe.
Close readings of major texts by Rimbaud (*A Season in Hell*), Rilke (*The Duino Elegies, The Sonnets to Orpheus*), Pound (*Hugh Selwyn Mauberley*, selections from the *Cantos*), and Eliot (*The Waste Land, The Four Quartets*) in the context of the emergence of modernism. Special attention will be given to the relationship between poetry and history and to questions of literary tradition, reception, and modernist aesthetics. Foreign language texts may be read in translation.

493–494 Senior Essay 493, fall; 494, spring. 4 credits.
Hours to be arranged. Staff.

498 Dostoevsky, Mann, and Gide Fall 4 credits.
W 2:30–4:30. W. W. Holdheim.
The development of the novel form and of certain important themes, as illustrated in some of the chief works of these three representative authors. Among others, *Notes from the Underground, The Brothers Karamazov, Doctor Faustus, Death in Venice*, and *The Counterfeiters* will be discussed.

594 Vico and Gramsci and the Development of Modern Italian Thought (also Italian 594) Fall 4 credits.
W 2:30–4:25. P. D'Acierno.
For description see Comparative Literature 394

603 History of Literary Theory Fall 4 credits
M 3:30–5:30. W. J. Kennedy.
For description see Comparative Literature 403.

664 Early European Fiction Spring 4 credits.
T 2:30–4:30. W. Cohen.
The novel and cultural revolution. Novella, picaresque, and the origins of the novel, 1350–1750. Links between the emergence of the form and the rise of capitalism, in light of contemporary theories of narrative, genre, realism, and social and literary history. Primary readings: Boccaccio, *Decameron; Lazarillo de Tormes;* Quevedo, *El Buscon (The Swindler);* Cervantes, *Exemplary Novels* and *Don Quixote;* Mme. de Lafayette, *The Princess of Cleves;* Richardson, *Pamela;* and Fielding, *Shamela* and *Joseph Andrews*. Texts available in English.

699 The Hermeneutic Tradition (also German 699) Spring. 4 credits. Open to qualified undergraduates after consultation with the instructor.
M 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

The Ideology of Imperialism: The Augustan Age in Rome and England (Society for the Humanities 415–416) 415, fall; 416, spring.
W 1:25–3:10. L. Brown.

Rhetorical Analysis (Society for the Humanities 421) Fall.
M 1:25–3:10. R. Lanham.

Pastoral Speakers and Contexts (Society for the Humanities 427) Fall.
R 1:25–3:10. T. Kelley.

Allegory, Representation, and the Visual Arts (Society for the Humanities 428) Spring.
R 1:25–3:10. T. Kelley.

The Interaction of Classical and Non-Classical Elements in the Tragedie-Lyrique (Society for the Humanities 429) Fall.
Hours to be arranged. L. Rosow.

Classicism in Early American Poetry: Adam and Aeneas (1516–1750) (Society for the Humanities 431) Fall.
T 3:35–5:20. J. Shields.

Classicism in Early American Poetry: Adam Becomes Aeneas (1750–1800) (Society for the Humanities 432) Spring.
T 3:35–5:20. J. Shields.

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

Medieval Romance: The Voyage to the Otherworld (English 210) Fall.

Between Hermeneutics and Deconstruction: The Politics of Contemporary Criticism (English 405) Fall.

German

Nietzsche, the Man and the Artist (German 314) Spring.

Computer Science

D. Gries, chairman; Ö. Babaoglu, J. L. Bates, K. Birman, D. Bitton, 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, A. Nicolau, G. Salton, F. B. Schneider, D. Skeen, R. Teitelbaum, S. Toueg, C. Van Loan, V. Vasirani

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 222) and Computer Science 622 (as a related elective) and concentrate in some branch of applied mathematics. Qualified students are encouraged to concurrently major in mathematics.

Admission

The prerequisites for admission to the major are:

1) completion of Computer Science 100–211–280 (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 222 or 421.

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 (except Computer Science 415 and 600 and seminar courses).

Students are expected to select related electives that complement their concentration.

Concentration

This component encourages the student to study some discipline outside of computer science in reasonable depth. The concentration consists of an approved sequence of four courses (at least 14 credits) numbered 200 or higher in some field related to the theoretical or practical aspects of computing. A list of approved concentrations is available in the Computer Science 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

Honors. A student may be granted honors in computer science upon the recommendation of the Computer Science Academic Affairs Committee. The committee guidelines will generally be the following:

1) an overall grade-point average of not less than 3.25
2) a grade-point average for all computer science courses of not less than 3.5
3) satisfactory completion of at least two computer science courses numbered above 600 or satisfactory completion of a significant special investigation (Computer Science 490).

Courses

For complete course descriptions, see the computer science listing in the College of Engineering.

100 Introduction to Computer Programming Fall, spring, or summer. 4 credits. Students who plan to take both Computer Science 101 or 102 and 100 must take 101 or 102 first.
2 lecs; 1 rec (optional). 3 evening exams.

101 The Computer Age 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.

102 Introduction to Microprocessor Use Fall. 3 credits. May be taken *only* for out-of-college credit by students in the College of Arts and Sciences. Not open to students in the College of Engineering.
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.

222 Introduction to Scientific Computation (also Engineering 222) Spring. 3 credits. Prerequisites: Computer Science 100 and Mathematics 112, 122, or 192
2 lecs. 3 evening exams.

280 Discrete Structures 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. Not offered 1984–85.
2 lecs.]

314 Introduction to Computer Systems and Organization Fall or summer. 4 credits. Prerequisite: Computer Science 211 or equivalent.
2 lecs, 1 rec. 2 evening exams.

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.

[412 Introduction to Compilers and Translators Fall. 4 credits. Prerequisite: Computer Science 314. Prerequisite or corequisite: Computer Science 481. Offered alternate years. Not offered 1984–85.
3 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. Prerequisite: Computer Science 314. Not offered 1984–85.
2 lecs, 1 lab.]

421 Numerical Solution of Algebraic Equations Fall. 4 credits. Prerequisites: Mathematics 294 or 222, one additional mathematics course numbered 300 or higher, and knowledge of FORTRAN at the Computer Science 222 level.
3 lecs.

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 1984–85.
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 1984–85.]

621 Matrix Computations Fall. 4 credits. Prerequisites: Computer Science 421 and Mathematics 411 and 431 or permission of instructor.
3 lecs.

622 Numerical Optimization and Nonlinear Algebraic Equations Spring. 4 credits.
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.

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.]

661 Robotics Fall. 4 credits. Prerequisites: Computer Science 611 and 681 or permission of instructor.
3 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.

714 Distributed Computing 4 credits. Prerequisites: Computer Science 414 and an advanced systems course (e.g., Computer Science 613, 614, 632, or 643).
2 lecs.

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 1984–85.]
2 lecs.

[734 Seminar in File Processing Fall. Credit to be arranged. Prerequisite: Computer Science 733 or permission of instructor. Not offered 1984–85.]

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. Prerequisites: Computer Science 681 and 682 or permission of instructor. S-U grades only. 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. 159.

Economics

K. Burdett, chairman; T. Mitra, graduate field representative; R. Frank, director of undergraduate studies; R. Chirinko, T. E. Davis, D. Easley, L. Ebrill, R. Ehrenberg, G. Fields, G. Hay, W. Isard, A. E. Kahn, N. Kiefer, P. D. McClelland, M. Majumdar, R. Masson, 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., J. Wissink, R. Wright, 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 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 1984–85 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 redistributional 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
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
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: calculus plus Economics 313 or Civil and Environmental Engineering 321. Analysis of economic bases for government intervention in a market economy. Topics include public goods, cost-benefit analysis, public finance, environment regulation and risk management, and macroeconomic topics.

309 Capitalism and Socialism (also Industrial and Labor Relations 347) Fall. 4 credits. Prerequisite: permission of instructor.

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.
For description see Economics 311.

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 Introduction to Statistics and Probability 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 hypothesis testing (of sample means, proportions, variance). Regression analysis and correlation are introduced.

320 Introduction Econometrics Spring. 4 credits Prerequisites: Economics 101–102, 319, or equivalent, and calculus.
Introduction to the theory and application of econometric techniques. How econometric models are formulated, estimated, used to test hypotheses, and used to forecast; understanding economists' results in studies using regression model, multiple regression model, and introduction to simultaneous equation models.

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 Spring. 4 credits. Prerequisites: Economics 101–102 or permission of instructor.
A survey of problems in American economic history from the Civil War to World War I.

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.

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.
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. Prerequisites: Economics 313 or Civil and Environmental Engineering 321.
Explores technological bases for government intervention in the private market economy, which include decreasing cost industries (natural monopolies) and technical externalities (pollution and risk). The economic implications of regulating electric, gas, and communications and transportation utilities, including pricing, service quality, efficiency incentives, and long-range planning issues, are examined in detail. Topics on environmental protection and societal risk management are also explored.

355 Politics and Markets Fall. 4 credits. Prerequisites: Economics 311 or 313, and 312 or 314, or equivalents.
The course uses the tools of applied price theory to examine the tension between individual and collective goals in the modern welfare state. Topics covered include theories and policies related to income redistribution, regulation of the labor contract, paternalism, and the left's critique of capitalism.

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. (A research paper will be required if the 4-credit option is chosen.) Prerequisites: Economics 101–102.
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.
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. Prerequisites: Economics 313 or 311.

373 International Specialization and Economic Development Spring. 4 credits. Prerequisites: Economics 101–102 or permission of instructor.
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
After 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 the 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.
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.

419 Economic Decisions under Uncertainty Fall. 4 credits. Prerequisites: Economics 319 and calculus.
This course provides an introduction to the theory of decision making under uncertainty with emphasis on economic applications of the theory.

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? 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-mangement 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.

516 Applied Price Theory Fall. 4 credits.
The course emphasizes the applications of the principles of price theory to a variety of problems taken from concrete, practical settings.

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.

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 asymetric 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.

624 American Economic History Spring. 4 credits.

626 Methods in Economic History Spring. 4 credits.

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.
An integration of urban economics and location theory with local public goods and state and local public finance topics. Both equilibrium models and dynamic analyses are explored.

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.

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.

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.

671 Economics of Development Spring 4 credits.

672 Economics of Development Fall. 4 credits

673 Economic Development Spring. 4 credits
Prerequisites: Economics 509, 520.
The course is concerned with theoretical and applied works that seek to explain economic development, or lack thereof, in countries at low-income levels. Specific topics vary each semester.

674 Economic Systems Spring. 4 credits.

678 Economic Growth in Southeast Asia Spring. 4 credits.

679 Theory of Quantitative Economic Policy Spring. 4 credits.

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 and spring. 4 credits.

English

D. M. Mermin, chairman; R. Morgan, director of undergraduate studies (363 Goldwin Smith Hall, 256-5184); M. Abrams, 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. Elledge, R. T. Farrell, E. G. Fogel, D. Fried, L. Green, J. Harris, L. Herrin, T. D. Hill, 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, S. P. Mohanty, T. C. Murray, D. Novarr, S. M. Parrish, M. A. Radzinowicz, E. Rosenberg, P. L. Sawyer, D. R. Schwarz, M. Seltzer, H. E. Shaw, S. Siegel, W. J. Slatoff, J. Stallworthy, S. C. Strout, G. Teskey, W. Wetherbee

Visiting professors and postdoctoral fellows: A. Holder, A. Kibbey, L. Sukenick, S. Vaughn, J. Welsh

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 pp. 214–215.

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: M. Abrams, 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, 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 Bronte, Conrad, Hardy, Hemingway, Faulkner, Ellison, Vonnegut, and others; poems by Browning, Hopkins, and Frost; plays by Shaw and one or two modern playwrights. Two lectures and a small discussion section each week. One or two short papers, perhaps a prelim, and a final examination.

210 Medieval Romance: The Voyage to the Otherworld Fall. 3 credits.
M W F 11:15. T. Hill.
The course will survey some representative medieval narratives concerned with voyages to the otherworld or with the impinging of the otherworld upon oridinary experience. The syllabus will normally include some representative Old Irish otherworld literature; selections from the *Mabinogion;* selections from the *Lais* of Marie de France; Chretien de Troyes's *Erec, Yvain,* and *Lancelot;* and the Middle English *Sir Orfeo, Sir Gawain and the Green Knight,* and the *Tam Lin* ballads. We will finish by looking at a few modern otherworld romances, such as ones by Lewis Carroll, J. R. R. Tolkien, and Madeleine L'Engle. All readings will be in modern English. Requirements: three brief (two to three typed pages) papers and a final exam designed to test the students' reading.

[219 Myth and Heroic Legend Spring. 3 credits Not offered 1984–85]

227 Shakespeare Fall or spring. 3 credits. Each section limited to 25 students.
M W F 1:25, or T R 12:20–1:35 or 2:30–3:45. S. Elledge and staff.
A critical study of representative plays from the principal periods of Shakespeare's career.

260 Contemporary American Indian Literature (also American Indian Studies 260) Spring 3 credits.
M W F 11:15–12:05. J. Welch.
The purpose of this course is to study the creative writings (novels, short stories, poems) of contemporary American Indian authors. We will discuss the traditions out of which the work evolved. We will also discuss the social issues addressed in the writings. Finally, we will talk about literary merit and about the differences, if any, between these writers and those writers of the more dominant European/American mainstream.

288–289 Expository Writing 288, fall; 289, spring. 3 credits each term. Each section limited to 18 students.
M W 9:05, 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 usually 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, the novel, and autobiography.

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 1984 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, two twentieth-century works, Jean Rhys's *Wide Sargasso Sea* and Edith Wharton's *Ethan Frome*, will be approached as imaginative sequels to *Jane Eyre* and *Wuthering Heights*, respectively.

[251 Twentieth-Century Women Novelists (also Women's Studies 250) Spring. 4 credits Not offered 1984–85.]

253 The Modern Novel Spring 4 credits.
M W F 11:15. 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. Not offered 1984–85.]

[277 Folklore and Literature Fall. 4 credits. Not offered 1984–85]

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 9:05, 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 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 1:25 or T R 10:10–11:25.
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 1:25, J. Bishop.
The problem of an American national literature is explored through the reading, discussion, and close analysis 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 and language with which critical appreciation must engage. Works by such writers as Franklin, Hawthorne, Twain, Stephen Crane, Wharton, James, and Fitzgerald.

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, 11:15, 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.

290 Literature and Value Spring. 4 credits.
T R 10:10–11:25 J. McConkey and others.
Each week a different member of the department discusses a poem, group of poems, story, play, or novel that is of particular importance to him or her, perhaps as a work that contributed to the person's decision to devote a lifetime to the study of literature or to the writing of fiction or verse, perhaps as a work that has affinity with present-day concerns. In following meetings that week, class members will discuss in detail the same or related works. Students will be encouraged to explore, in their papers for the course as well as their discussions, the relationship between specific texts and their own experience, attitudes, and values.

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. Not offered 1984–85.]

[318 Saga as Historical Novel: An Introduction to Saga Literature Fall. 4 credits. Not offered 1984–85.]

320 The Sixteenth Century: Tudor Culture Spring. 4 credits. Offered alternate years.
M W F 12:20. C. Levy.
The development of English as an imaginative and persuasive medium, from Wyatt and Ascham through Sidney, Spenser, Marlowe, Shakespeare (the nondramatic verse), and Hooker. Consideration in particular of lyric verse, pastoral, epic, and epyllion; prose stylistics and rhetorical doctrine; such early prose fiction as that of Greene, Lodge, and Nashe; with some attention to Elizabethan drama other than Shakespearean and a brief excursion into late Elizabethan counterculture. Discussion and informal lecture. Each student will write two short papers and a term paper of about eight pages and will conduct class discussion on the topic of one of those papers. Offered only in alternate years.

[322 The Seventeenth Century Spring 4 credits. Not offered 1984–85; next offered 1985–86]

330 Restoration and Eighteenth-Century Literature Spring. 4 credits.
Hours to be arranged. S. Davis.
For description see department brochure.

[333 The Eighteenth-Century English Novel Fall. 4 credits. Not offered 1984–85; next offered 1985–86]

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 Spring 4 credits. Not offered 1984–85; next offered 1985–86.]

[348 The Female Literary Tradition: Wollstonecraft to Woolf (also Women's Studies 348) Spring. 4 credits. Not offered 1984–85; next offered 1985–86]

350 The Early Twentieth Century (to 1914) Fall. 4 credits.
M W F 1:25. P. Marcus.
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. The course will be conducted by a combination of lectures and intensive seminars in special topics. Although the emphasis 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 Fall. 4 credits.
M W F 12:20. 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.

321 Spenser and Malory Fall. 4 credits.
M W F 11:15. C. Kaske.
Paired selections covering about half of Malory's *Mort d'Arthur* and half of Spenser's *Faerie Queene*. Chretien's romances and some of Spenser's minor poems will be mentioned occasionally as background. Comparisons will assess possible literary influence, the distinctive genius of each author as a writer of romance, and the development of Arthurian romance from the Middle Ages to the Renaissance. Informal lecture and discussion. Two papers, no exams.

327 Shakespeare Fall. 4 credits.
M W F 9:05. A. Caputi.
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. M. A. Radzinowicz.
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. A. Kibbey.
Major novels, essays, and poetry of the mid-nineteenth century. Emphasis on the development of the symbolist imagination and social idealism in works by Emerson, Fuller, Thoreau, Hawthorne, Melville, and Dickinson.

363 The Age of Realism and Naturalism Fall 4 credits.
T R 10:10. A. Holder.
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. Not offered 1984–85; next offered 1985–86]

365 American Literature since 1945 Spring. 4 credits. Limited to 55 students.
M W F 10:10. J. Bishop.
This course will alternate with English 364, which surveys American literature between the two world wars. It will accordingly be concerned with a sequence of texts that can be taken to represent different aspects of the cultural moment we are still accustomed to call our own. Prose fiction will be represented by works chosen from such writers as Ellison, Salinger, Bellow, Kerouac, Roth, Updike, Pynchon, Morrison, and Walker. An anthology of poetry will include Lowell, Ginsberg, Plath, Bly, and many others. Criticism and journalism may be represented by Trilling, Mailer, and Didion. The texts chosen will be read as testimony to what certain Americans have found it possible or impossible to believe in through these years.

Genres and Special Topics

[366 The Earlier American Novel: Nathaniel Hawthorne to Henry James Not offered 1984–1985; next offered 1985–86]

367 The Modern American Novel (through World War II) Spring 4 credits.
M W F 1:25. W. Slatoff.
A reading of some major American novels of the first half of the twentieth century. Works by Wharton, Dreiser, Hemingway, Fitzgerald, Faulkner, Wright, and others. Lectures with some opportunity for discussion. Empahsis will be upon the individual works, but some larger patterns will be viewed.

[368 The Contemporary American Novel Not offered 1984–85.]

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. B. B. Adams.
Major events in the English theatre from the Middle Ages to the beginning of the twentieth century. Plays by the Wakefield Master, Marlowe, Shakespeare, Jonson, Dryden, Wycherly, Congreve, Sheridan, Shelley, Shaw, and others. Dramatic texts, theatrical conventions, social conditions, and their interrelationships.

Creative and Expository Writing

382–383 Narrative Writing 382, fall, 383, spring. 4 credits each term. Each section limited to 15 students. Students are encouraged to take English 280–281 previously. Prerequisite: permission of instructor, normally on the basis of a manuscript.
M W 2:30 or T R 12:20, plus conferences to be arranged. Fall: A. Lurie, L. Sukenick; spring: S. Vaughn, L. Sukenick.
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 except Ammons's section, which is limited to 12 students. Prerequisites: English 280 and 281 and permission of instructor.
Fall: M W 10:10, P. Janowitz; T 2:30–4:25, A. Ammons. Spring: hours to be arranged, K. McClane.
The writing of poetry; study of models; analysis of students' poems; personal conferences.

386 Autobiographical Writing Fall. 4 credits. Limited to 18 students. Prerequisite: permission of instructor. Interested students should submit a writing sample to Professor McMillin before the beginning of the term.
T R 2:30–3:45. S. McMillin.
A course in autobiographical writing and reading. Students will keep journals, which will be the source of finished autobiographical essays. Readings in such journalists and autobiographers as J. Boswell, T. DeQuincey, V. Woolf, and J. Agee.

388–389 The Art of the Essay 388, fall; 389, spring. Limited to 18 students. Prerequisites: permission of instructor. Interested students should submit a writing sample to the appropriate professor before the beginning of the term.
Fall: T R 12:20 and conferences to be arranged; spring: M W 2:30 and conferences to be arranged. L. Fakundiny.
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.

405 Between Hermeneutics and Deconstruction: The Politics of Contemporary Criticism Fall. 4 credits Limited to 15 students. Open only to undergraduates. Prerequisite: permission of instructor. Background in literary studies will be expected, but no training in critical theory will be presumed.
T R 2:30–3:45. S. P. Mohanty.
An introduction to some of the major issues in contemporary criticism through an examination of the relationship between two influential movements in critical theory—hermeneutics and deconstruction. Adherents of both movements seem to agree about the fundamental opposition between their respective approaches and conclusions. We shall try to understand the issues at stake in this opposition, exploring such questions as: what is a (literary) text? what is interpretation, and what are its limits? what political issues underlie particular critical strategies, and methodological choices? We shall negotiate between the competing claims of each position and focus on the implications of answers to such questions in actual critical analysis. Primary readings from some of the chief exponents of the two movements, particularly Paul Ricoeur, Hans-Georg Gadamer, and Jacques Derrida. Additional readings from a variety of critical and philosophical traditions—such writers as Barthes, Eagleton, Felman, Foucault, and Jameson.

[408 The Evolution of the Epic 4 credits. Not offered 1984–85; next offered 1985–86.]

409 Freud as Imaginative Writer and Reader (also Comparative Literature 409) Spring. 4 credits. Limited to 15 students. Open to all students who have taken at least one literature course at the 200 level or above.
T R 2:30–3:45. C. Chase.
This course will introduce Freud as a imaginative writer and a reader of imaginative writing—the source of psychoanalytic criticism. Texts will include works by Freud, Shakespeare, Sophocles, and E. T. A. Hoffmann. No previous familiarity with Freud's writings or with psychoanalytic theory is necessary.

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.

412 Beowulf (also English 612) Spring. 4 credits.
T R 2:30–3:45. T. Hill.
A close reading of *Beowulf* from origin. Attention will be given to relevant linguistic and literary problems.

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.

423 The Map of Seventeenth-Century Poetry: School, Genre, and Ideology in the Verse of the Period. Spring. 4 credits.
M W F 12:20. M. A. Radzinowicz.
This course (offered in alternate years with English 408, The Evolution of the Epic) will read the principal poets of the period through the major critical discriminations by which they have usually been examined, seeking to describe their value to each other and to subsequent poets and critics as precisely and as richly as we can. Although the focus will be primarily on the poets themselves and their interrelationships, some attention will necessarily be given to the value of such devices as subperiod, school, genre, and ideology in understanding works of the past. The poets that we will discuss include Samuel Butler, Thomas Carew, Richard Crashaw, John Donne, John Dryden, George Herbert, Robert Herrick, Ben Jonson, Richard Lovelace, Andrew Marvell, John Milton, the Earl of Rochester, Thomas Traherne, Henry Vaughan, and Edmund Waller.

424 Lyric Sequences (also English 624) Spring. 4 credits.
Hours to be arranged. C. Levy.
The art of the lyric sequence and a sketch of its history from Dante's *La Vita Nuova* and Petrarch's *Canzoniere* (in translation as necessary) to Meredith's *Modern Love* and Berryman's *Sonnets*. About half the semester will be devoted to the work of Sidney, Greville, Spenser, and Shakespeare. As part of a typical meeting of the seminar, one member will conduct the discussion of a major topic; he or she will

then write a short paper pursuing that topic, but no more than two such papers in the course of the semester. Each student will also write a substantial term paper.

427 Studies in Shakespeare Fall and spring 4 credits each term.

Fall: Shakespeare and Elizabethan English
T R 12:20–1:35. B. Adams.
A close study of selected works, nondramatic as well as dramatic, with special attention to the distinctive features of sixteenth- and seventeenth-century English as means of coming to a fuller understanding and appreciation of Shakespeare as a literary artist. The nondramatic works will include *Venus and Adonis* and *The Rape of Lucrece* as well as selected sonnets. The plays will probably include *Love's Labor's Lost, Richard II, Troilus and Cressida,* and *Antony and Cleopatra.*

Spring: Shakespeare on Film
T R 2:30–3:45. T. Murray.
We will analyze the transformation of Shakespeare's plays into films. Attention will be focused on two aspects of film and analysis. First, we will consider carefully the film's interpretation of the text—how does the visual image influence the viewer's reception of the text? Second, we will consider the critical and technical choices made by the filmmakers and actors to portray the interpretation—how does a film ask the viewer to watch it, and what filmic techniques contribute to the image? These issues will lead naturally to considerations of the differences between stage and film representations of the plays. A preliminary syllabus might include *Othello* (films by Yutkevich and Burge, with Olivier), *King Lear* (Kozintsev and Brooks), *Hamlet* (Olivier and Kozintsev), *Macbeth* (Polanski and Kurosawa, *Throne of Blood),* and *The Tempest* (video and a new British release).

[429 Milton and Romantic Poetry 4 credits. Not offered 1984–85.]

432 Samuel Johnson (also English 632) Fall. 4 credits.
T R 2:30–3:45. D. Eddy.
A detailed study of Dr. Johnson's writings, concentrating on his English poetry, periodical essays, his writings on Shakespeare, Milton, and Pope; *Rasselas,* the *Lives of the Poets, A Journey to the Western Islands of Scotland,* plus book reviews and other literary criticism. In all, a complete bicentennial celebration!

[441 Romantic Fictions, Romantic Selves 4 credits. Not offered 1984–85.]

447 The Last Victorians Fall. 4 credits.
M W F 1:25. S. Parrish.
Responses to the breakup of "Victorian" values in the late 1880s and 1890s in the fiction, plays, poetry, and critical writings of Hopkins, Housman, and Hardy; Pater, Wilde, and Beerbohm; Shaw, William Morris, and H. G. Wells. We will try to understand how these reponses have helped to shape the values that define the "modern world."

450 The History of the Book Spring. 4 credits. Limited to 20 students. Prerequisite: permission of instructor.
T 7–9 p.m. D. Eddy.
A study of the physical aspect of books printed during the last six centuries. Included are papermaking, typography and printing, bookbinding, and the history of book illustrations; the transmission of texts and bibliographical descriptions of hand-printed and modern trade books. Above all, this is the study of the book as a work of art.

[453 Victorians and Modernists: Literary Legends from Wilde to Woolf (also Women's Studies 453) 4 credits. Not offered 1984–85.]

454 Theatre and Society (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. M. Hays.
An examination of the role theatre has played in society. This year the course will focus on the English "Blue-Book" dramatists of the nineteenth century and in particular on the work of Tom Tayler.

455 Contemporary American Theatre: Avant-Garde and Beyond Fall. 4 credits.
T R 2:30–3:45. 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, and 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) 4 credits. Not offered 1984–85; next offered 1985–86.]

458 Contemporary British Drama Spring. 4 credits.
T R 10:10. S. McMillin.
The contemporary scene in English theatre. Plays by Tom Stoppard, Harold Pinter, Peter Shaffer, Caryl Churchill, David Edgar, Howard Breton, and Edward Bond, with particular concern for the theater as a political and social institution.

[463 The Political Novel in America 4 credits Not offered 1984–85.]

[464 American History and Literary Imagination 4 credits. Not offered 1984–85.]

465 Stevens and Crane Fall. 4 credits.
M W F 11:15. L. Green.
Close, exploratory readings of most of the poetry of these two writers. The course is primarily intended for third- and fourth-year students and will require four short papers and oral reports.

[466 Poetry of the Fifties, Sixties, and Seventies 4 credits. Not offered 1984–85.]

467 James, Hemingway, Fitzgerald Fall. 4 credits.
T R 12:20–1:35. W. Slatoff.
Study and discussions of *The American, The Portrait of a Lady, The Sun Also Rises, A Farewell to Arms, The Great Gatsby, Tender Is the Night,* and other writings of the three authors. Although the emphasis will be upon our responses to the individual novels, it is no accident that nearly all the books concern experiences of Americans in Europe, and some special illumination may come from that.

468 James Baldwin Fall. 4 credits.
T R 2:30–3:45. K. McClane.
In the thirty years since his first novel, *Go Tell It on the Mountain,* James Baldwin has continued his eloquent, painful, and brilliant analysis of the American search for an identity encyclopedic enough to embrace the presence of black people. Reading widely among his fiction, essays, and drama, we will appreciate why Baldwin remains our best chronicler of the rage and love, bitterness and hope, desire and despond, which, when taken together, form so crucial a part of the Afro-American and American genesis. Readings will include *Notes of a Native Son, Another Country, Sonny's Blues, Go Tell It on the Mountain, Blues for Mr. Charlie, Giovanni's Room, Going to Meet the Man,* and *If Beale Street Could Talk.*

469 Four Modern Poets: Ammons, Frost, Dickey, Berryman Spring. 4 credits.
T R 12:20–1:35. R. Kirschten.
We will spend three weeks on each poet, supplementing our textual analysis with readings from anthropology, several schools of literary criticism, and biographical information when relevant. We will also listen to recordings of each poet.

470 Studies in the Novel Spring 4 credits. Limited to 15 students. Prerequisite: permission of 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) 4 credits. Not offered 1984–85.]

477 Children's Literature Fall. 4 credits.
T R 2:30–3:45. A. Lurie.
A survey of classic English and American works for children from 1850 to the present. Special topic for 1984: Folklore and fiction. Among the readings are Jacobs, *English Fairy Tales;* MacDonald, *The Princess and the Goblin;* Carroll, *Alice in Wonderland;* Alcott, *Little Women;* Twain, *Tom Sawyer;* Stevenson, *Treasure Island;* Kipling, *The Jungle Books,* Baum, *The Wizard of Oz;* Barrie, *Peter Pan;* Nesbit, *The Five Children* and *It* or *The Amulet;* Grahame, *The Wind in the Willows;* Milne, *Winnie-the-Pooh;* Tolkien, *The Hobbit;* White, *Charlotte's Web;* L'Engle, *A Wrinkle in Time.*

480–481 Seminar in Writing 480, fall; 481, spring 4 credits. Limited to 15 students. Students are encouraged to take English 280–281 and either 382–383 or 384–385 previously. Prerequisite: permission of instructor, normally on the basis of a manuscript.
Fall: M 2:30–4:25, R. Morgan; W 2:30–4:25, W. Slatoff. Spring: W 12:20–2:15, K. McClane.
Intended for those writers who have already gained a basic mastery of technique. Students normall 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. Not offered 1984–85.]

488 Writing about Literature Spring. 4 credits.
T R 12:20–1:35. D. Fried.
This is a course for students who want more practice writing and who are curious about why people write about literature in the variety of ways they do. Not a survey of literary theory, Writing about Literature is designed to help literature majors (and prospective majors) to become aware of the range of approaches available to them and to develop a critical style congenial to their interests. Through reading, discussing, and writing about both literary and critical texts, we will explore such topics as the assumptions that underlie the ways we make sense of literature; comparing the ways we develop arguments about plays, poems, and novels; evaluating how feminist criticism has revised recent thinking about literature; the relations between literature and literary commentary; and the powers of criticism as an institution. Students will write a series of short exercises (one to three pages) and three longer papers averaging five pages in length. Readings will include *Hamlet;* Wharton's *The House of Mirth;* poems by Donne, Dickinson, and Williams; Brooks's *The Well Wrought Urn;* and a range of essays from Coleridge to the present.

491 Honors Seminar I: Realism in the English Novel Fall. 4 credits.
T R 10:10. H. Shaw.
This course will explore the question of what is realistic about the English novel. The guiding assumption will be that realism involves the relationship between history and the novelistic text, though other conceptions of literary realism will also be considered. Readings will include relevant theoretical writings, but the primary focus will rest on a selection of major works of fiction, which for various reasons might be considered realist novels. Probable reading list: Austen, *Mansfield Park;* Eliot, *The Mill on the Floss* and *Middlemarch;* Dickens, *Hard Times* and *Little Dorrit;* Conrad, *The Secret Agent* and *Nostromo.*

492 Honors Seminar II: Yeats and Joyce Spring. 4 credits.
M W F 1:25. P. Marcus.
A study of major poems, plays, and prose by Yeats and of Joyce's *Dubliners, A Portrait of the Artist, Ulysses,* and *Finnegans Wake* (selections). Not a survey, the course will focus on key points of intersection in the careers of these two dominant figures and on the complex relationship between them. This focus will permit exploration of larger issues involving influence, the Irish context, and the modern movement itself.

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 Old Norse Fall. 4 credits.
J. Harris.

609 Psychoanalysis and Literary Theory Spring 4 credits.
C. Chase.

611 Old English Fall. 4 credits.
T. Hill.

612 Old English Spring. 4 credits.
J. Hill.

619 Chaucer Fall. 4 credits.
W. Wetherbee.

622 Renaissance Prose Spring. 4 credits.
M. A. Radzinowicz.
G. Teskey.

623 Metaphysical Poets Spring. 4 credits.
D. Novarr.

624 Lyric Sequences Spring. 4 credits.
C. Levy.

626 Renaissance Narrative Fall. 4 credits.

627 Shakespeare Spring. 4 credits.
S. McMillin.

631 Earlier Eighteenth Century Spring. 4 credits.
F. Bogel.

632 Age of Johnson Fall. 4 credits.
D. Eddy.

641 Keats and Shelley Fall. 4 credits.
C. Chase.

642 Wordsworth and Coleridge Spring. 4 credits.
S. Parrish.

645 Victorian Poetry Spring. 4 credits.
D. Mermin.

661 The "Literature" of Puritanism Fall. 4 credits.
M. Colacurcio.

662 Nineteenth-Century American Novelists Spring. 4 credits.
M. Seltzer.

665 Contemporary American Poetry Fall. 4 credits.
A. Holder.

668 Afro-American Novel Spring. 4 credits.
Gates.

669 Edith Wharton and Henry James Fall. 4 credits.
J. Blackall.

678 Eliot and Scott Fall. 4 credits.
H. Shaw.

671 Evolution of the Novel II Spring. 4 credits.
D. Schwarz.

672 Contemporary Drama Spring. 4 credits.
A. Caputi.

691 Theories of Language and Literature Fall. 4 credits.
J. Culler.

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.

727 Problems in Shakespearean Tragedy Fall. 5 credits.
E. Fogel.

759 Virginia Woolf Spring. 5 credits.
S. Siegel.

765 Dickinson Spring. 5 credits.
D. Fried.

780.1 M.F.A. Seminar: Prose Fall 5 credits.
A. Caputi.

780.2 M.F.A. Seminar: Poetry Fall. 5 credits.
P. Janowitz.

781.1 M.F.A. Seminar: Prose Spring. 5 credits.
J. McConkey

781.2 M.F.A. Seminar: Poetry Spring. 5 credits.
A. Ammons.

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) 201, fall; 202, spring.

The Novella in World Literature (Comparative Literature 314) Spring.

Rhetoric and Technology (Comparative Literature 315) Fall.

The European Novel (Comparative Literature 363–364) 363, fall; 364, spring.

Poetry of the Late Eighteenth and Nineteenth Century (Comparative Literature 370) Fall

Twentieth-Century Poetry (Comparative Literature 371) Spring.

Marxist Cultural Theory (Comparative Literature 381) Fall.

History of Literary Theory (Comparative Literature 403/603) Fall.

Readings in the New Testament (Comparative Literature 429) Fall.

The Modernist Poetic Sequence (Comparative Literature 492) Spring.

Dostoevsky, Mann, and Gide (Comparative Literature 498) Fall.

Early European Fiction (Comparative Literature 664) Spring.

The Hermeneutic Tradition (Comparative Literature 699) Spring.

Society for the Humanities

The Ideology of Imperialism: The Augustan Age in Rome and England (Society for the Humanities 415/416) Fall and spring

Rhetorical Analysis (Society for the Humanities 421) Fall.

Pastoral Speakers and Contexts (Society for the Humanities 427) Fall.

Allegory, Representation, and the Visual Arts (Society for the Humanities 428) Spring.

Classicism in Early American Poetry: Adam and Aeneas (1516–1750) (Society for the Humanities 431) Fall.

Classicism in Early American Poetry: Adam Becomes Aeneas (1750–1800) (Society for the Humanities 432) Spring.

French

See Modern Languages, Literatures, and Linguistics, pp. 159–162 and 171.

Geological Sciences

D. L. Turcotte, chairman; A. L. Bloom, director of undergraduate studies; R. Allmendinger, W. A. Bassett, J. M. Bird, L. D. Brown, J. L. Cisne, A. K. Gibbs, B. L. Isacks, T. E. Jordan, 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 sixteen faculty members, including Cornell's president, in the department, and 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 two-semester sequences, Mathematics 191–192 and Physics 112–113, or their equivalents, and an additional semester course in chemistry or biological sciences, such as Chemistry 207. Geological Sciences 101–102 or 201 are recommended, but a student with a strong foundation in mathematics and science may be accepted as a major without completion of 101–102 or 201.

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, plus an additional course in mathematics, physics, chemistry, or biology at an intermediate or advanced level.

Core Courses

326 Structural Geology
355 Mineralogy
356 Petrology and Geochemistry
375 Sedimentology and Stratigraphy
388 Geophysics and Geotectonics

Prospective majors should consult one of the following departmental major advisers: W. A. Bassett, W. B. Travers, J. Oliver, A. L. Bloom, or A. K.Gibbs, as early as possible for advice in planning a program. Students majoring in geological sciences may attend the departmental seminars and take advantage of cruises, field trips, and conferences offered through the Department of Geological Sciences.

Courses offered at the 100 and 200 level are open to all students. Certain 300-level courses in geology may be of particular interest to students of chemistry, biology, ecology, and physics. Students are encouraged to inquire about courses that interest them at the department office in Snee Hall.

Honors. An honors program is offered by the Department of Geological Sciences for superior students. Candidates for honors must maintain an overall 3.0 grade-point average and a cumulative average of 3.5 in the major and complete a senior thesis (Geological Sciences 490). Students interested in applying should contact the director of undergraduate studies during the second semester of the junior year.

Courses

For course descriptions see the Geological Sciences listing in the College of Engineering.

German Literature

P. Hohendahl, chairman; H. Deinert, director of undergraduate studies; E. A. Blackall, I. Ezergailis, 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, pp. 162–165.

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, M. Goldfield, S. Jackson, G. McT. Kahin, M. Katzenstein, P. Katzenstein, E. W. Kelley, E. G. Kenworthy, R. King, R. N. Lebow, T. J. Lowi, D. Meyers, T. J. Pempel, J. Pontusson, J. Rabkin, R. H. Rosecrance, M. Rush, L. Scheinman, M. Shefter, V. Shue, S. G. Tarrow, N. T. Uphoff, P. Vaughan

Government is what Cornell calls a department that elsewhere might be termed *political science*. The focus of this discipline is power applied to public purposes. Some faculty members concentrate on purposes, some on applications. Some engage in the close reading of great texts of political philosophy, while others analyze the behavior of power-wielders and publics in this and other societies. Government is divided into four subfields: United States politics, comparative politics (other nations), political theory (philosophy), and international relations (transactions between nations).

To accommodate new courses or course changes, a supplementary announcement is prepared by the department. Before enrolling in courses or registering each term, students are requested to consult the current supplement lisiting courses in government, available in 125 McGraw Hall.

The Major

To be *admitted* to the major, a student must have passed or be currently taking two government courses, one an introductory course, the second any other course offered by the department, including Freshman Seminars.

To *complete* a major in government, the student must (1) pass three of the four introductory courses; (2) accumulate 24 credits in courses numbered 300 or higher, including one seminar; and (3) complete 12 credits in related fields, again at the 300 level or higher. All courses used to fulfill a government major must be passed with a letter grade. Majors are urged to complete the introductory course requirement early in their stay at Cornell.

Seminars are those courses numbered 300, 400, and 500, plus whatever additional course the director of undergraduate studies may designate from time to time. To be admitted to a seminar, students apply during the course scheduling period held the previous semester. *Related fields* normally include courses offered by these departments: Anthropology, Economics, History, Psychology, and Sociology. Majors should discuss their selection of related courses with their advisers. When approved by an adviser or by the director of undergraduate studies, courses from still other departments may be used to fulfill this requirement.

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. 99

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," p. 218.

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. 141, 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.
M. J. Esman.
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.
I. Kramnick.
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 p. 215, 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 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 1984–85.]

[302 The Impact and Control of Technological Change 4 credits. Not offered 1984–85.]

[303 American Democracy and the Limits to Growth 4 credits. Not offered 1984–85.]

[309 Interpretation of American Politics 4 credits. Not offered 1984–85.]

[310 Power and Poverty in America 4 credits. Not offered 1984–85.]

311 Urban Politics Fall. 4 credits.
M. Shefter.
The interaction between urban problems and the politics of city government has resulted in important public policy issues in the United States. This course provides an introduction to the politics of metropolitan areas; analysis of the central institutions and processes of urban government, such as mayors, city councils, elections, and the criminal justice system; and specific public policy problem areas such as race relations, education, housing, law enforcement, and civil disorder.

312 Urban Affairs Laboratory Fall or 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 1984–85.]

[316 The American Presidency 4 credits. Not offered 1984–85.]

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 1984–85.]

[321 Public Policy and Public Revenues 4 credits. Not offered 1984–85.]

[322 Criminal Justice. 4 credits. Not offered 1984–85.]

[323 The "Fourth" Branch 4 credits. Not offered 1984–85.]

327 Civil Liberties in the United States Spring. 4 credits.
J. Rabkin.
An analysis of contemporary issues in civil liberties and civil rights, with emphasis on Supreme Court decisions. Cases are analyzed in terms of democratic theory and the social and political context in which they arose.

328 Constitutional Politics: The United States Supreme Court Fall. 4 credits.
J. Rabkin.
The course investigates the role of the Supreme Court in American politics and government. It traces the historical development of constitutional doctrine and the institutional role the Court has played in American politics.

[329 Race, Gender, and Politics 4 credits. Not offered 1984–85.]

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 dual ideals of individual choice and group equality.

403 Cleavages and Conflicts in Contemporary American Politics Fall. 4 credits.
B. Ginsberg, M. Shefter.
The central political conflict in contemporary America pits the forces of the New Politics against the forces of the Reconstituted American Right. The emergence of this conflict is among the most important political phenomena of the past quarter century. The outcome of this struggle will play a key role in determining the shape and character of the American political regime in the twenty-first century.

[406 Politics of Education 4 credits. Not offered 1984–85.]

[411 Political and Economic Power in Cities 4 credits. Not offered 1984–85.]

[412 Size of the State 4 credits. Not offered 1984–85.]

414 The Administrative State Spring. 4 credits.
J. Rabkin.
This course will examine the problem of how—or whether—legitimate governmental authority can be distinguished from arbitrary coercion in a modern era of pervasive regulation. It will consider, in turn, several different theoretical approaches to this problem, as illustrated in the works of modern legal

and social theorists, in some landmark cases in the history of American administrative law, and in a representative sampling of modern cases. But the course will also look at several case studies of the regulatory process in today's world, suggesting the difficulties of applying—or putting much reliance on—these accepted approaches in actual practice.

[424 Political Change in the United States 4 credits. Not offered 1984–85.]

[426 Science, Technology, and Public Policy 4 credits. Not offered 1984–85.]

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.

283 Contemporary European Society and Politics (also History 283) Spring. 4 credits.
S. Tarrow, J. H. Weiss.
An introduction to European societies, their development, and current dynamics. Topic for 1984–85: The Formation of Europeans. Education, community, and culture in Western Europe, with an emphasis on how concepts of identity, community, class, and culture are acquired by young Europeans and developed in the worlds of family, school, work, and politics. The course is designed for students with an interest in, or experience of, various European countries, who wish to increase their knowledge of Western Europe. There are no formal prerequisites.

326 Eastern Europe Today: Economics, Government, Culture (also Russian Literature 329 and Economics 329) Fall 4 credits.
M. Rush, G. Gibian, G. Staller.
Introductory, interdisciplinary survey of Poland, Hungary, Czechoslovakia, and Yugoslavia since World War II, with emphasis on contemporary developments. The goals of the course are to examine differences among East European countries as well as common elements (for example, variety of backgrounds, political relations with the USSR, domestic situations, and the economies and cultures.)

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 4 credits. Not offered 1984–85.]

[335 Cuba: Culture and Revolution 4 credits. Not offered 1984–85.]

336 The Ethnic Dimension in Politics Fall 4 credits.
M. Esman.
The origin, expression, and regulation of political competition and conflicts arising from ethnic, linguistic, racial, and religious pluralism. The political problems of communally divided societies are examined from a comparative perspective. Data are drawn from several countries, including Canada, Malaysia, South Africa, and Yugoslavia, as well as the United States.

340 Latin American Politics Fall. 4 credits.
S. Jackson.
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 1984–85.]

[342 Government and Politics of Canada 4 credits. Not offered 1984–85.]

[344 Government and Politics of Southeast Asia 4 credits. Not offered 1984–85.]

345 The Politics of Scholarship: Romanticism and Racialism in the Formation of Classics Spring. 4 credits.
M. Bernal.
The seminar will be on the formation of *Altertumswissenschaft,* or Classics, between 1770 and 1830. It will be concerned with social and political developments in northern Europe over the same period. Particular attention will be paid to the relationship between the rise of the new discipline and the simultaneous triumphs of romanticism and racialism.

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.
M. Bernal.
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 Commmunist regime since 1949.

[348 Politics of Industrial Societies 4 credits. Not offered 1984–85.]

[349 Political Role of the Military 4 credits. Not offered 1984–85.]

350 Comparative Revolutions Fall. 4 credits.
M. Bernal.
An analysis of the French, Russian, and Chinese revolutions, treating their social, cultural, and political origins as well as their ideology and organization. Special emphasis is given to the nature of the state to which they are opposed and the course of the revolutionary struggle.

[351 India: Social and Economic Change in a Democratic Polity 4 credits. Not offered 1984–85.]

[352 Society and Politics in Saudi Arabia (also Near Eastern Studies 398) 4 credits Not offered 1984–85.]

354 America in the World Economy Fall. 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 1984–85.]

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 1984–85.]

358 Politics of the Middle East (also Near Eastern Studies 294) Fall. 4 credits.
A. Alayon.
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 Fall. 4 credits.
P. Katzenstein, T. J. Pempel.
Defeated in World War II, West Germany and Japan today are among the most prosperous, stable democracies in the industrial world. In the postwar era West German and Japanese policies reflect an osmosis of American political precepts, imposed by the occupation forces, overlaid onto historical traditions marked by delayed industrialization, authoritarianism, and fascism. This course analyzes key aspects of West German and Japanese political strategies at home and abroad in the light of their domestic power structures and international constraints.

[431 Theories of the State 4 credits. Not offered 1984–85.]

432 Comparative Political Economy of Labor Fall. 4 credits.
J. Pontusson.
This course explores the dual role of unions as economic and political actors. The readings will deal with several countries: the U.S., Japan, Britain, France, and Sweden. We will try to determine what labor movements in these countries have in common as well as how and why they differ.

[435 Politics of Decentralization and Local Reform 4 credits. Not offered 1984–85.]

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 Policy-making in Britain and France 4 credits. Not offered 1984–85.]

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 1984–85.]

Political Theory

Government 161 is recommended.

361 Modern Ideologies: Liberalism and Its Critics Spring. 4 credits.
I. Kramnick.
Since the rise of capitalism, one political ideology has been dominant in the Western world—liberalism. However, its hegemony has been questioned by a series of critics: democracy, socialism, anarchism, conservatism, Freudianism, and feminism. This course will study the tensions between liberalism and these critics and speculate on the possible survival or extinction of this venerable and very American ideology.

362 Directions in Feminist Theory (also Women's Studies 365) Spring. 4 credits.
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.

[363 Classics in Political Thought Fall. 4 credits. Not offered 1984–85.]

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 1984–85.]

368 Political Economy of the Welfare State Spring. 4 credits.
E. W. Kelley.
This course will explore the evolution of the welfare state, including the development of its distinctive legal and bureaucratic institutions. It will also trace the continued delegation of public authority to private groups at both national and local levels of government. Patterns of political/economic institutions will be used to explain who receives social and economic goods through the public sector and the repeated occurrence of such problems as "stagflation."

[373 Feminist Political Thought 4 credits. Not offered 1984–85]

[375 American Political Thought 4 credits. Not offered 1984–85]

376 Marx Fall. 4 credits.
W J. Dannhauser.
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 4 credits. Not offered 1984–85.]

[466 The Repressed Feminine in the Writings of Marx 4 credits. Not offered 1984–85.]

467 Current Topics in Political Philosophy (also Women's Studies 467) Fall. 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 (also Women's Studies 468) 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 Spring. 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 4 credits. Not offered 1984–85]

[383 Theories of International Relations 4 credits. Not offered 1984–85.]

384 War and Peace in the Nuclear Age (also Physics 206) 4 credits.
Lecs, M W F 2:30; 1 rec each week. P. Stein, N. Lebow.
For description see Physics 206.

[385 Contemporary American Foreign Policy 4 credits. Not offered 1984–85]

[386 Structure and Process in the Global Political Economy 4 credits. Not offered 1984–85.]

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 1984–85]

[478 Accumulation on a World Scale 4 credits. Not offered 1984–85.]

[479 *Dependencia* and the State 4 credits. Not offered 1984–85.]

[480 Foreign Economic Policies of Advanced Industrial States 4 credits. Not offered 1984–85.]

481 Foreign Policy of the USSR Spring. 4 credits.
M. Rush.
An analysis of Soviet foreign policy as it developed out of the Revolution and accommodated to the prevailing international system, with a focus on the period since 1945. Particular topics include causes and prospects of the cold war, impact of nuclear weapons on Soviet defense and foreign policy, sources and goals of Soviet hegemony in East Europe, causes of the dispute with China, and impact of domestic politics on the formation of foreign policy.

[482 Imperialism and Dependency 4 credits. Not offered 1984–85]

[483 Political and Economic Interdependence 4 credits. Not offered 1984–85.]

[484 Defense Strategy 4 credits. Not offered 1984–85]

[487 Covert Intervention as an Instrument of American Foreign Policy 4 credits. Not offered 1984–85]

488 Comparative Capitalism Fall 4 credits.
P. Katzenstein.
Confronted with economic crisis and change in the 1970s, the United States has chosen protectionism and deregulation; Japan, exports and industrial policy; and West Germany, labor market and regional policy. Why do the three leading capitalist economies react so differently to a common problem? This course seeks to answer the question by examining (1) the historical evolution of contemporary capitalism; (2) liberal, statist, and corporatist theories of capitalism; (3) the American, Japanese, and German experiences and, in lesser detail, those of Britain, France, and the small European states; and (4) the conditions that point to the transformation of contemporary capitalism.

Political Methodology

[391 Human and Social Statistics 4 credits. Not offered 1984–85.]

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.
Staff

494 Honors Thesis Clarification and Research Fall. 4 credits. Limited to students who have successfully completed Government 400 or 500 or who are taking 400 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.
M. Goldfield.
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 1984–85.]

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 Spring. 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 Fall. 4 credits.
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 1984–85.]

[619 Labor in American Politics 4 credits. Not offered 1984–85.]

621 Elections and Public Policy Spring. 4 credits
B. Ginsberg.
The relationship between citizen voting 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 linkages between citizen choices and the behavior of public officials.

[623 Capitalism, the State, and the Economy 4 credits. Not offered 1984–85.]

Public Policy

628–629 Politics of Technical Decisions I and II (also Management NBA 686–687 and City and Regional Planning 541–542) 628, fall; 629, spring. 4 credits.
D. Nelkin.
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 1984–85.]

[637 Comparative Theories of Decentralization 4 credits. Not offered 1984–85.]

[639 Politics of the Soviet Union 4 credits Not offered 1984–85.]

[642 The Politics of Communalism 4 credits. Not offered 1984–85.]

[645 Politics in China 4 credits Not offered 1984–85.]

[647 Political Anthropology: Indonesia (also Anthropology 628) 4 credits. Not offered 1984–85.]

[648 Political Economy of Change: Rural Development in the Third World 4 credits Not offered 1984–85.]

[651 Readings from Mao Zedong 4 credits. Not offered 1984–85.

[652 Political Problems of Southeast Asia 4 credits. Not offered 1984–85.]

653–654 The Plural Society Revisited (also Asian Studies 607–608) Fall. 4 credits.
B. Anderson.
John Furnivall's concept, invented forty years ago, posited colonial society as one in which race (and ethnicity), class, occupation, and residence were distributed more or less isomorphically. The seminar will review the utility of the concept in the light of subsequent research on colonial Southeast Asia, and its applicability to developments since the achieving of independence. It will also consider the relevance of the concept to (uncolonized) modern Thailand. The core problematic will be the relationship between classification (naming) and power.

[655 Latin American Society and Politics 4 credits. Not offered 1984–85.]

[656 Comparative Institutions and the Welfare State 4 credits. Not offered 1984–85.]

[659 Politics in Postwar Western Europe 4 credits. Not offered 1984–85.]

[660 Research Topics on Advanced Industrial Democracies: Social Movements, Collective Protest, and Policy Innovation 4 credits. Not offered 1984–85]

Political Theory

665 American Political Thought Fall. 4 credits. W. J. Dannhauser.
Major works by Americans about American problems, including Jefferson, Madison, Paine, Lincoln, and Douglass. The course will give special emphasis to the founding and the Civil War but will not be limited to these topics.

[666 The Political Philosophy of Nietzsche 4 credits. Not offered 1984–85]

[667 Justice and Equality: The Philosophical Foundation of Public Policy Not offered 1984–85]

[668 Foundations of English Liberation 4 credits. Not offered 1984–85.]

[669 Modern Social Theory I Fall. 4 credits. Not offered 1984–85]

[670 Modern Social Theory II 4 credits. Not offered 1984–85.]

[673 Economic Models of Politics 4 credits Not offered 1984–85.]

[678 Greek Political Philosophy 4 credits. Not offered 1984–85.]

International Relations

[686 International Strategy 4 credits. Not offered 1984–85]

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, M. J. Esman.
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, and 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. 121.

Hebrew

See Department of Near Eastern Studies, pp. 180–181.

Hindi-Urdu

See Modern Languages, Literatures, and Linguistics, p. 165.

History

R. L. Moore, chairman (fall); D. K. Wyatt, chairman (spring); D. A. Baugh, S. Blumin, S. G. Cochran, T. H. Holloway, C. Holmes, R. Hsia, I. V. Hull, J. J. John, M. Kammen, S. L. Kaplan, J. V. Koschmann (director of undergraduate studies, 327 McGraw Hall, 256-3899), D. C. LaCapra, W. F. LaFeber, 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, 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 Civilizations (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, or 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 normally enroll with their advisers in History 401, Honors Research, during the first term of their senior year. History 401 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 401, 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 402, Honors Thesis, during the final semester of the senior year. History 402 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 402 by their final semester.

Honors candidates must complete a minimum of 40 credits in history, 8 of which must be History 400 and 402. 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 Not offered 1984–85 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 Not offered 1984–85. 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 1984–85.
M. B. Norton.
An examination of the American family in the context of changing times from the seventeenth century to the present day. Readings include both primary and secondary sources. Students research the past experience of their own families as part of the course.]

[108 Civil Liberties in the United States
Prerequisite: permission of instructor. Not offered 1984–85.
R. Polenberg.
Freedom of speech and dissent from Jefferson's time to the present, with emphasis on the twentieth century. Topics include Jefferson and Burr, Lincoln and martial law; war and the Supreme Court; the American Civil Liberties Union and the New Deal; the relocation of Japanese Americans; the cold war and McCarthyism; religious cults and "brainwashing"; censorship and obscenity; John Milton, John Stuart Mill, and the critique of libertarianism.]

[112 The North Atlantic Community and the Wider World Not offered 1984–85.
T. H. Holloway.
The relationship between the attitudes and values of Europeans and the emergence of the global economic and political network since the Age of Discovery. The voyages of exploration, commercial expansion, and the consolidation and dissolution of modern empires are considered. Texts contemporaneous with these periods will be read and discussed to explore ways members of the North Atlantic community have explained and justified their emerging world influence in religious, racial, technological, and cultural terms.]

127 American Foreign Policy, 1750–1912 Fall 3 credits.
T R 2:30–3:45. H. S. Faroqui.
The seminar will examine U.S. foreign policy between 1750 and 1912. It will begin with the Puritans and Benjamin Franklin and end with the Progressives and Williard Straight. Emphasis is on the domestic as well as the foreign determinants contributing to the origin and development of foreign policy.

128 American Foreign Policy, 1912–1985 Spring 3 credits.
T R 2:20–3:45. H. S. Faroqui.
The seminar will analyze U.S. diplomatic history from Woodrow Wilson to Ronald Reagan. It seeks to introduce students to important diplomatic events, key decision makers, and crucial ideological as well as nonideological issues of twentieth-century American foreign policy.

129 American and Russian Worldviews Spring. 3 credits.
Hours to be arranged: V. M. Harrington.
Americans and Russians view the world, as nations generally do, through ideological and cultural lenses peculiar to each. Domestic events, culture, and literature serve to shape and reflect these unique views. The seminar will begin in the eighteenth century with Peter the Great's "Rules for the Russian Nation" and the political thought of Madison and Jefferson. Two keen observers toured the respective nations in the nineteenth century—the Marquis de Custine in Russia and Alexis de Tocqueville in the U.S.—keeping journals, and we will read selections from both. The mid-nineteenth century brought criticisms and reforms within both countries, as seen in the literature and prose of Turgenev, Pushkin, Emerson, and Thoreau. Was the imperialism of the 1890s a deviation for Americans? Did the Bolshevik Revolution radically alter the Russian worldview? The final part of the course will deal with the consequences of these respective worldviews, with the emergence of both nations as superpowers after World War II.

143 Family and Community in Modernizing Societies Spring. 3 credits.
T R 8:40–9:55. 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.

158 Education in the Renaissance and Reformation Fall. 3 credits.
M W F 11:15. J. L. Carrington.
What role does education have in other historical events and processes, such as political and religious upheaval? This question will be one of the major concerns of the course, as we examine topics in late Renaissance ideals of education and their effect on the course of the Reformation. The first third of the semester will concentrate on readings from primary and secondary sources relating to such humanist educators as John Colet and Juan Luis Vives. There will follow several weeks devoted to Erasmus, chiefly to those of his works concerning education. For at least one week we will examine the printing press and its impact on writers, educators, and the reading public, and the problems and opportunities connected with the proliferation of books and learning. The remainder of the term will be concerned with the Reformation, beginning with Erasmus's biblical scholarship and attempts on his part to make the Bible more widely accessible through such means as the *Paraphrases*. We will move on to consider translations of the Bible into the vernacular, particularly by Luther and Calvin, and to discuss their aim to give access to the Bible to a wider reading public.

159 Medieval Poverty: Salvation and Revolution Spring. 3 credits.
M W F 9:05. J. Oakley.
Medieval people believed both that poverty was the surest way to salvation and that the poor were antisocial and inclined to rebellion. We will examine the ideology of poverty as it was developed by the leading classes and will then look at the ways in which poor people appropriated this ideology to justify rebellion. We will read both medieval sources in translation and some modern works.

[171 Revolution and Russian Society Not offered 1984–85.
W. M. Pintner.
The state's attempt to maintain stability, and the tension between the dissenting intelligentsia and the mass of the population are examined. Russia before and after the revolution of 1917 is discussed.]

[176 Britain and the Second World War 3 credits
Prerequisite: permission of instructor. Not offered 1984–85.
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.]

180 Darwin and the Nineteenth Century Fall. 3 credits.
T R 2:30–3:45. M. Bogin.
Charles Darwin was influenced by the scientific, literary, and social milieu of Victorian England when he developed his theory of evolution, published in 1859. The *Origin of the Species* rapidly became a best-seller, and its ideas revolutionized definitions of humanity, morality, and an omnipotent God. This course will examine the major contributors to Darwin's thought, the social context in which it developed, and some of the ideas derived from Darwinian theory.

192 Japan and the West Fall. 3 credits
Prerequisite: permission of instructor. Limited to 12 students.
M W 1:25, plus one hour to be arranged.
J. V. Koschmann.
Topic: Hiroshima and Nagasaki: policy decisions and physical, social, and psychological impact; historic significance.

[193 China and the West before Imperialism
3 credits. Open to freshmen and sophomores. Prerequisite: permission of instructor. Not offered 1984–85; next offered 1985–86.
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 and making reference to actual circumstances in the China of the day.]

205 The Growth of Political Democracy in the United States Fall. 3 credits. Limited to 14 students. Prerequisite: permission of instructor.
T 2:30–4:30. 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.

214 Seminar on American Foreign Policy Fall 4 credits. Open to freshmen and sophomores. Limited to 12 students; preference will be given to non–history majors. Prerequisite: permission of instructor.
T 2:30–4:25. 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.

[219 Freshman Seminar: History of North American Indians 3 credits. Not offered 1984–85.
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.]

[246 America in the Camera's Eye Fall. 3 credits. Open to freshmen and sophomores. Prerequisite: permission of instructor. Not offered 1984–85.
R. L. Moore.
The seminar will attempt to assess the value of visual material (especially photography) in understanding twentieth-century American history. Students will read and view the work of some leading American photographers in an effort to understand how the camera has both reflected and helped create America's perception of itself. Frequent papers aim at helping students develop a vocabulary to articulate their reactions to visual material.]

Underclass Seminars

203 The American Dream Fall. 4 credits.
Prerequisite: permission of instructor.
T 2:30–4:30. F. Somkin.
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.

205 Freshman Seminar: The Growth of Political Democracy in the United States Fall. 3 credits Limited to 14 students. Prerequisite: permission of instructor.
T 2:30–4:30. J. H. Silbey.

208 Anarchism in America and Europe Spring. 4 credits. Prerequisite: permission of instructor.
T R 12:20–1:35. R. Polenberg
Topics include Godwin, Bakunin, and Kropotkin; anarchism and socialism; the libertarian tradition; anarchists in the Russian Revolution; Emma Goldman and Alexander Berkman; the red scare and the Sacco-Vanzetti case; the Spanish civil war; anarchism and education.

[209 Political History of Indians in the United States Not offered 1984–85.
D. H. Usner.
An investigation of political organization and change among Native American societies. Discussions and assignments examine forms of tribal government, diplomacy, and warfare, as well as political relations with European colonies and the United States. Specific topics include pan-Indian confederacies, Indian policy, struggles over sovereignty, and Indian strategies of autonomy and resistance.]

214 Freshman Seminar: American Foreign Policy Fall. 4 credits. Open to freshmen and sophomores. Limited to 12 students; preference will be given to non–history majors. Prerequisite: permission of instructor.
T 2:30–4:25. W. LaFeber.

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.

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, Maugham, O'Casey, Sherrif, and Osborne.

227 Historical Perspectives on Modern American Sex Roles (also Women's Studies 227) Spring. 4 credits. Limited to 20 students. Intended primarily for sophomores.
M 2:30–4:25. M. B. Norton.
A reading and discussion course. The class will begin by examining sex roles in the United States in the 1980s, looking at a variety of sources like popular magazines and contemporary commentaries. We will then move backwards in time in an attempt to uncover the roots of current attitudes. The students will help determine which topics the class will investigate in detail.

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 students's own choice. Several short papers.

Comparative History

[274 Foodways: A Social History of Food and Eating 4 credits. Not offered 1984–85.
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 Spring. 4 credits.
M W F 1:25. C. A. Peterson.
A study of the principal modes of warfare found both in the East and the West from ancient times up to the eighteenth century. Tactical evolution and the impact of innovations are stressed, but attention is also paid to the general social background and the role of nonmilitary factors.

[407 Death in Past Time 4 credits. Not offered 1984–85.
S. L. Kaplan.
Every culture has felt an urgent need to deal with death: to disarm, rationalize, and integrate it by giving it sense. How a culture perceives and propitiates death reveals a great deal about its social and political structure, religious and artistic values, and economic and scientific goals. The nature of death is considered using a wide variety of examples drawn from throughout history.]

History of Science

281–282 Science in Western Civilization 281, fall; 282, spring. 4 credits each term. History 281 is not a prerequisite to 282.
T R 10:10–12:05. L. P. Williams.
The development of scientific thought from antiquity to the present. Readings and discussions of original sources.

[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. Not offered 1984–85
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. Not offered 1984–85.
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.]

[447–448 Seminar in the History of Biology 447, fall; 448, spring. 4 credits. Not offered 1984–85.
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.]

481–482 Scientific Revolution 481, fall; 482, spring. 4 credits.
T 2–4:30. L. P. Williams.

487–488 The Physical Sciences in the Twentieth Century 487, fall; 488, spring. 4 credits each term. Prerequisite: some knowledge of quantum physics.
M W F 10:10. B. Reeves.
Fall term: The "second" scientific revolution that has totally transformed our views of nature and of natural processes began in the years 1895–1900, when X-rays, radioactivity, and Planck's quantum theory shocked the world of classical physics. What had seemed a finished system of thought turned out to be wrong, its foundations were assailed, and a new worldview was created. Old quantum theory and Einstein's theory of special and general relativity redefined both the nature of reality and of the scientist. This term is concerned with this revolution. Spring term: By 1927, a new and relatively coherent vision of the physical world—quantum mechanics—was accepted by most physical scientists. Now the problem was to apply it to real and specific cases. We will here look at some of the more important applications in astrophysics, chemistry, and the physics of the atom, both extranuclear and nuclear.

680–681 Seminar in the History of Nineteenth-Century Physical Science Fall, 680; spring, 681. 4 credits each term.
Hours to be arranged. L. P. Williams.

American History

201–202 Introduction to American History 201, fall; 202, spring. 3 credits each term.
M W F 11:15. G. C. Altschuler.
A survey of United States history designed to introduce students to major themes and interpretations. History 201 traces the origins and evolution of the nation through 1865. Topics include Puritanism, the American Revolution, the Constitution, Jacksonian democracy, and the Civil War. History 202 covers the period from the Civil War to the present. Topics include the Reconstruction, the Gilded Age, the world wars, the 1960s, Vietnam, and Watergate.

[275 Crime and Punishment: From the Puritans to Mickey Spillane 4 credits. Not offered 1984–85.
F. Somkin.
A historical investigation into how the American literary imagination has dealt with the way of the transgressor. Readings from Arthur Miller, Hawthorne, Cooper, Melville, Van Tilburg Clark, Stowe, Dreiser, Cozzens, West, Wouk, Wright, Caine, Hammett, Chandler, and Spillane.]

[311 The Structure of American Political History Fall. 4 credits. Not offered 1984–85; next offered 1985–86.
J. H. Silbey.

Examines the course of American politics from 1787 to the Civil War, focusing on the nature of decision making, popular and legislative voting behavior, and the role of interest groups, political parties, and political elites in shaping our political history.]

312 The Structure of American Political History Spring. 4 credits.
M W F 10:10, plus optional section. J. H. Silbey.
Examines the course of American politics from 1865 to the present, focusing on the nature of decision making, popular and legislative voting behavior, and the role of interest groups, political parties, and political elites in shaping our political history.

[313–314 History of American Foreign Policy 313, fall; 314, spring. 4 credits each term. Not offered 1984–85.
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 Spring. 4 credits.
M W F 11:15. M. B. Norton.
A study of the major themes of the constitutional history of the United States. Among the topics to be considered are the drafting of the Constitution, the Marshall and Taney courts, civil rights decisions of the nineteenth century, the rise of substantive due process, and the Warren and Burger courts.

[321 The Origins of American Civilization 4 credits. Not offered 1984–85; next offered 1985–86.
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.]

323–324 Native American History 323, fall; 324, spring. 4 credits each term.
M W F 12:20. D. H. Usner.
A survey of North American Indians from the beginning 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.

[325 Age of the American Revolution, 1763–1815 Not offered 1984–85.
M. B. Norton.
An examination of the process by which the thirteen English colonies became an independent and united nation, with emphasis on political thought and practice, social and economic change, and cultural development.]

[326 Women in the American Society, Past and Present Not offered 1984–85.
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 1984–85; next offered 1985–86.
D. H. Usner.
Survey of exploration, settlement, and expansion across North America since the sixteenth century. First term covers international rivalry over territory, frontier trade systems, Indian-colonial relations, and the early administration of United States territories. Topics in second term include the evolution of land and Indian policies, life in frontier communities, and political movements and economic change in the American West.]

[330 The United States in the Middle Period, 1815–1850 4 credits. Not offered 1984–85; next offered 1986–87.
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 4 credits. Not offered 1984–85; next offered 1986–87.
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 332, fall; 333, spring. 4 credits each term. 332 is not prerequisite to 333.
M W F 11:15. S. Blumin.
An examination of the process of urbanization in America from the earliest European settlements to the present. Emphasis will be placed on the development of urban forms, institutions, classes, and life-styles and on the changing impact of cities upon nonurban areas and the nation as a whole. The first term covers the period up to the emergence of the industrial city (ca. 1860); the second term covers the period from 1860 to the present.

[336–337 American Social History 336, fall; 337, spring. 4 credits each term. History 336 is not a prerequisite to 337. Not offered 1984–85; next offered 1985–86.
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 late nineteenth and twentieth centuries.]

[340 Recent American History, 1917 to 1945 4 credits. Not offered 1984–85; next offered 1986
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 Fall. 4 credits.
T R 12:20; disc to be arranged. R. Polenberg.
Topics include the cold war and civil liberties; the Supreme Court and civil rights; Kennedy, Johnson, and social reform; the Vietnam War; the Carter and Reagan presidencies; class, race, and ethnicity in modern America.

[344 American Ideas from the Puritans to Darwin 4 credits. Not offered 1984–85.
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 Fall. 4 credits.
M W F 11:15; disc to be arranged. R. L. Moore.
American thought and culture from 1890 to the present. Emphasizes the intellectual impact of major political and economic events and the adaptation of social ideas and values to new conditions.

346 Religion in American History Spring. 4 credits.
M W 11:15; disc to be arranged. R. L. Moore.
Examination of the interaction of the ideas and behavior of American religious groups with American culture and society. The course covers the nineteenth and early twentieth century.

411 Undergraduate Seminar in American Political History Fall. 4 credits. Prerequisite: permission of instructor.
M 2:30–4:25. J. H. Silbey.
Topic for 1984: the history of the election of 1984

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 4 credits. Prerequisite: permission of instructor. Not offered 1984–85; next offered 1985–86.
J. H. Silbey.]

419 Seminar in American Social History Fall 4 credits. Prerequisite: permission of instructor.
R 2:30–4:30. S. Blumin.
Topic for 1984: the emergence of the middle class, 1775–1900. The hypothesis of middle-class formation will provide a common theme for reading, discussion, and individual research.

[421 Constitutionalism as a Cultural Problem in America 4 credits. Prerequisite: permission of instructor. Not offered 1984–85; next offered 1985–86.
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 1984–85.
M. B. Norton.
This seminar will examine in depth the lives and political thought of three of the most influential founding fathers of the United States: John Adams, Thomas Jefferson, and James Madison. The class will read widely in the political writings of each and interpret those writings in light of each man's life and experiences. Discussion will focus on their individual and collective contributions to the shaping of the American political system.]

428 Undergraduate Seminar in American Frontier History Spring. 4 credits.
R 10:10–12:05. D. H. Usner.
Topic for 1985: land and labor on American frontiers. This seminar examines economic life in frontier regions, focusing comparatively on relations between land and labor. Students will explore forms of work organization and of land use that shaped frontiers from colonial times to the present and will investigate the influence of ethnicity, class, and regionalism on frontier conflict. The evolution of U.S. land policy and ideological concepts linking labor with land are also traced.

[429 Undergraduate Seminar in Indians of Eastern North America 4 credits. Not offered 1984–85.
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 4 credits. Enrollment limited. Prerequisite: permission of instructor. Not offered 1984–85.
T 2:30–5. F. Somkin.
A seminar covering (1) an overview of American law from colonial times to the twentieth century, and (2) an examination of selected topics such as vigilante justice, the legal enforcement of morality, the insanity defense to homicide, the present agony of the criminal justice system, and the dissolution of social authority generally.]

440 Undergraduate Seminar in Recent American History Spring. 4 credits. Prerequisite: permission of instructor.
T R 2:30–3:45. R. Polenberg.
Topic for 1985: the Supreme Court and free speech: Holmes and Brandeis.

[445 Undergraduate Seminar: Deviance and Conformity in a Liberal Society Not offered 1984–85.
R. L. Moore.
Reading and research to focus on constraints placed on religious practice in democratic America.]

[613–614 Seminar on American Diplomatic History Not offered 1984–85.
W. LaFeber.]

[615–616 Seminar in American Cultural and Intellectual History Not offered 1984–85.
F. Somkin.]

[617–618 Seminar in Recent American Cultural History Not offered 1984–85.
R. L. Moore.]

619 Seminar in American Social History Fall. 4 credits.
R 2:30–4:25. S. Blumin.

[621 National Myths in Comparative Perspective 4 credits. Prerequisite: permission of instructor. Not offered 1984–85; next offered 1985–86.
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 Asian traditions. There will also be contextual readings on nationalism and mythology in general.]

624 Graduate Seminar in American Indian History Fall. 4 credits.
R 2:30–4:25. D. H. Usner.
Topic for 1984: anthropology and history in the study of Indian societies during the colonial period.

[626–627 Graduate Seminar in the History of American Women Not offered 1984–85.
M. B. Norton.]

[633–634 Seminar in Nineteenth-Century American History Not offered 1984–85
J. H. Silbey.]

710 Colloquium in American History Spring 4 credits. Required of all first-year American history graduate students.
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.
W F 11:15 plus disc, M 11:15, 12:20, or 2:30.
C. A. Peterson, J. V. Koschmann, D. K. Wyatt.
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. Not offered 1984–85; next offered 1985–86.
W F 11:15 plus disc, M 11:15, 1:25, or 2:30.
S. Cochran, D. K. Wyatt.
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 Spring 4 credits. Not offered 1984–85; next offered 1985–86.
W 2:30–4:30. S. Cochran, M. Young.
The relationship between the visual arts and social change in China from the seventeenth century to the present. The value of art as a reflection of social reality and as an agent for social reform is analyzed on the basis of a variety of visual materials, which range from calligraphy, paintings, and porcelains of the seventeenth and eighteenth centuries to woodblock prints, photographs, and films of the nineteenth and twentieth centuries.]

393 History of China up to Modern Times Fall. 4 credits.
T R 10:10 plus an additional hour, M 11:15 or 1:25.
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. Staff.
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 Spring. 4 credits.
T R 11:15; disc to be arranged. D. K. Wyatt.
A survey focusing on cultural, social, and economic change in Southeast Asia.

397 History of Japan to 1750 Fall. 4 credits.
M W F 9:05. J. V. Koschmann.
A survey of Japanese history from its beginnings to the early modern period. Attempts to draw relationships among such factors as political and institutional change, social structure, aesthetic sensibility, literary form, and religious consciousness. Primary texts in translation will be read whenever feasible.

398 History of Modern Japan Spring 4 credits.
M W F 9:05. J. V. Koschmann.
A survey of Japan from the mid-eighteenth through the mid-twentieth centuries, with special attention to changing configurations of institutional structure, knowledge, action, and conceptions of history. Japanese political, literary, and philosophical texts will be read and discussed in addition to secondary sources.

[399 War as Myth and History in Postwar Japan (also Asian Studies 381) Fall 4 credits. Not offered 1984–85; next offered 1985–86.
T R 1:25. B. deBary, J. V. Koschmann.
How is the "war story" told in postwar Japan? The course will examine persisting manifestations of the war memory in contemporary Japanese cultural life, with emphasis on ways in which the story of World War II has been retold, reinterpreted, and given new symbolic and factual significance in light of changing historical circumstances. Class discussion will focus on the interpretation of tests, ranging from political thought and history to fiction, film, and poetry.]

[489 Seminar in Tokugawa Thought and Culture Spring. 4 credits. Prerequisite: some background in Asian or Western political thought; Japanese history; or classical Japanese religion, literature, or art. Not offered 1984–85; next offered 1985–86.
W 1:25–3:20. J. V. Koschmann.
An examination of conceptions of political order and legitimacy in relation to literary, artistic, and religious patterns in Japan from the seventeenth to mid-nineteenth centuries. Problems will include the eruption of new discourses in the eighteenth century, skepticism, urban culture, Western studies and, in the nineteenth century, millenarianism and restorationism.]

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 1984: the life of the medieval Chinese literati—social, cultural, and intellectual—as seen through literature, biographies, art, and other materials.

[493 Self and Society in Late Imperial and Twentieth-Century China Fall. 4 credits. Prerequisite: History 191 or 394, or permission of instructor. Not offered 1984–85; next offered 1985–86.
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 Spring. 4 credits. Prerequisite: permission of instructor.
Hours to be arranged. C. A. Peterson.

[693–694 Problems in Modern Chinese History 693, fall; 694, spring. 4 credits each term. Prerequisite: permission of instructor. Not offered 1984–85; next offered 1985–86.
Hours to be arranged. S. Cochran.]

[695 The Historiography of Southeast Asia Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1984–85.
Hours to be arranged. O. W. Wolters.]

696 The Historiography of Southeast Asia Spring. 4 credits. Prerequisite: permission of instructor.
Hours to be arranged. D. K. Wyatt.

[791–792 Seminar in Medieval Chinese History 791, fall; 792, spring. 4 credits each term. Prerequisite: permission of instructor. Not offered 1984–85; next offered 1985–86.
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. Not offered 1984–85; next offered 1985–86.
Hours to be arranged. S. Cochran.]

[795 Seminar in Southeast Asian History Fall. 4 credits. Not offered 1984–85; next offered 1985–86.
D. K. Wyatt.]

796 Seminar in Southeast Asian History Spring. 4 credits.
Hours to be arranged. D. K. Wyatt.

Ancient European History

[265 Ancient Greece from Homer to Alexander the Great 4 credits. Open to freshmen. Not offered 1984–85; next offered 1985–86.
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 4 credits. Not offered 1984–85; next offered 1985–86.
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 hothouses of a new religion: Christianity. Readings in translation include Arrian, Plutarch, Aristophanes, Menander, Theocritus, Polybius, the Book of Maccabees, Epicurus, and Lucretius.]

[452 The Tragedy of Classical Athens, 462–404 B.C. 4 credits. Prerequisite: History 265 or 373, or permission of instructor. Not offered 1984–85; next offered 1985–86.
M 2:30–4:30. B. Strauss.
The nature of Athenian democracy, society, and culture in Athens' "golden age." The course will examine the influence of Athenian political life on the great tragedians of the age and the influence of tragedy on the Athenians' conception of their character and history. Readings from Herodotus, Thucydides, Aeschylus, Sophocles, Euripides, Aristophanes, Plato, Aristotle, and Plutarch.]

[453 Crisis of the Greek City-State, 415–336 B.C. 4 credits. Enrollment limited. Prerequisite: History 265 or 373, or permission of instructor. Not offered 1984–85; next offered 1985–86.
M 2:30–4:30. B. Strauss.
The fortunes of the city-state and citizen in an age of uncertainty. The focus is on Athens, with some attention paid to the wider Greek world. Topics include the nature of Athenian politics, Athenian society, cultural change, the war between the city-states, *crisi* as a historical concept, and anthropology and ancient Greece. Readings in translation include Thucydides, Sophocles, Euripides, Aristophanes, Plato, Aristotle, Demosthenes, and Xenophon.]

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.
T R 11:15, disc to be arranged. Fall, C. Holmes; spring, staff.
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 Spring. 3 or 4 credits.
M W F 12:20. C. Holmes.
A survey of the government, social organization, and cultural and religious experience of the English, laying particular stress on the unification of the realm, the rise of Parliament, changes in agrarian organization, and the development of urban and commercial classes.

[263 The Earlier Middle Ages 4 credits. Not offered 1984–85; next offered 1985–86.
J. J. John.
A survey of medieval civilization from ca.300 to ca.1100, dealing with religious, intellectual, political, and economic developments in Western Europe.]

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.

308 Reformation Europe 1450–1650 Fall 4 credits.
M W 12:20; R disc to be arranged. R. Hsia.
Lectures and discussions on the origins of the Reformation, its impact, and the Catholic response. Topics include the medieval intellectual and social origins of reform, Luther, the Peasants' War, the Swiss and English reforms, Anabaptism, French wars of religion, witch-hunts, the Council of Trent, and the Jesuits.

309 Spain and the Netherlands in Early Modern Europe Spring. 4 credits.
M W 12:20; R disc to be arranged. R. Hsia.
The formation of the Spanish empire is contrasted with the emergence of the Dutch nation in the Eighty Years' War. Comparisons of economy, culture, social structure, religion, and overseas expansion. Lectures and discussions.

[349 Greece in Late Antiquity and Early Byzantine Times, A.D. 306–565 Not offered 1984–85.
B. Strauss.]

[350 Early Renaissance Europe Fall. 4 credits. Not offered 1984–85.
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.]

361 The Culture of the Early Renaissance (also Comparative Literature 361 and History of Art 350) Fall. 4 credits. No. prerequisites.
T R 1:25; disc to be arranged. C. Lazzaro, J. Najemy, with some lectures by W. Kennedy, E. Morris.
Renaissance culture is introduced through six major figures: Petrarch, Alberti, Machiavelli, Leonardo, Erasmus, and Rabelais. Each figure will be the focal point for the critical examination of problematic issues in the areas of humanism, religious and political thought, literature, art, and architecture. In the discussion sections problems of interpretation will be approached through the analysis of primary source readings and works of art.

362 Poems, Institutions, and Other Fictions in the Realm of Francis the First (also Romance Studies 362) Spring. 4 credits. Enrollment limited to fifteen students. Prerequisite: permission of either instructor.
T R 2:30–3:45. L. Carrington (history), E. Morris (Romance studies)
Life and letters in France from 1515 to 1547. This interdisciplinary course will be organized around such historical topics as kingship, warfare and diplomacy, printing and literacy, the rebirth of classical learning, religious reformation, and so on, and around the works of such writers as Marot, Rabelais, Calvin, Francis the First (himself an accomplished poet), and Francis's sister, Marguerite de Navarre. Other readings in chronicles and memoirs and in modern historians and literary critics. Consideration of recent reevaluations of theory and methodology in literary and historical scholarship. Reading knowledge of French useful but not indispensable.

365 Medieval Culture, 400–1150 Spring 4 credits.
T R 2:30–3:45. J. J. John.
Intellectual and cultural developments in the age of manasticism, from St. Augustine and St. Benedict to St. Anselm and St. Bernard of Clairvaux.

[366 Medieval Culture, 1100–1300 4 credits. Prerequisite: History 264 or permission of instructor. Not offered 1984–85; next offered 1985–86.
J. J. John
The origin and development of the universities will be studied as background for a consideration of the scholastic mentality and its influence on the art, literature, philosophy, science, script, and theology of the period. Readings from Abelard, Hugh of St. Victor, Bonaventure, Thomas Aquinas, Dante, etc.]

[367 Church and State During the Middle Ages Fall. 4 credits. Prerequisite: History 263–264 or permission of instructor. Not offered 1984–85.
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 Fall. 4 credits. Limited to 12 students. Prerequisite: History 264 or permission of instructor.
W 2:30–4:30. B. Tierney.
A seminar with lectures, class papers, and class discussions. The course will begin with detailed study of the early lives of Francis in translation, then consider the impact of the Franciscans on the medieval church and vice versa.

369 The History of Florence in the Time of the Republic, 1250–1530 Spring. 4 credits
T R 11:15; disc to be arranged. J. Najemy.
Florentine politics and society from the communal period through the age of Dante, the rise and decline of the guild republic, the age of civic humanism, and the rise of the Medici to the time of Machiavelli. Economic structures and social classes, corporate politics, family history, and political and historical ideas are considered in the context of the emergence and transformation of republican government.

371 History of England under the Tudors and Stuarts Fall. 4 credits. Prerequisite: permission of instructor.
T R 2:30–4:30. C. Holmes.
An examination of the relation between the intellectual developments of the period and political, social, and religious change. Topics for discussion will include political thought, religious toleration, witchcraft, and the role of women and the family.

374 War, Trade, and Empire, 1500–1815 Spring. 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 Fall. 4 credits.
Hours to be arranged. J. Nejemy.
Topic for 1984: Machiavelli.

473 Topics in Early Modern Intellectual History (Upperclass Seminar) Spring. 4 credits. Limited to 20 students.
Hours to be arranged. R. Hsia.
This course examines selected themes in the intellectual history of Western Europe between the Reformation and the Enlightenment. Topics include political thought, utopian social critique, views of God and man, cosmology, and epistemology.

[475 Seminar in the English Civil War, 1640–1660 4 credits. Not offered 1984–85; next offered 1985–86.
C. Holmes.
A close analysis of the causes and development of the war, and of the radical constitutional, religious, and social experiments of the period. Particular attention will be paid to the evaluation of the intense historiographic controversies surrounding this period in the light of the primary sources.]

[485 The Transformation of Feudal Society 4 credits. Not offered 1984–85.
C. Holmes.
The seminar will examine the ideas of a number of scholars who have suggested that England experienced a major shift in the nature of social organization and relations in the sixteenth century. Theories about feudal society and its collapse will be tested against contemporary legal and literary sources concerning the political, social, and religious experience of the English people in the Middle Ages.]

659 Seminar in Society and Religion in Early Modern Europe Fall. 4 credits.
Hours to be arranged. R. Hsia.
A thematic introduction to the recent historiography on the social history of religion in Western Europe between the fifteenth and the eighteenth centuries. Selected readings in French and German.

663 Seminar in Renaissance History Spring. 4 credits. Open to qualified undergraduates with permission of instructor.
Hours to be arranged. J. Najemy.
Topic to be announced.

664–665 Seminar in Latin Paleography 664, fall; 665, spring. 4 credits each term.
Hours to be arranged. J. J. John.

[666 Seminar in Medieval History Fall. Not offered 1984–85.
J. J. John]

669 Seminar in Medieval History Spring. 4 credits.
W 2:30–5. B. Tierney.
Topic for spring 1985: introduction to medieval canon law.

Modern European History

152 Introduction to Western Civilization Spring 3 credits.
T R 11:15; disc to be arranged. Staff.
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 4 credits. Not offered 1984–85.
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.]

283 Contemporary European Society and Politics (also Government 283 and German Literature 283) Spring. 4 credits. No formal prerequisites.
R 2–4, plus disc to be arranged. J. H. Weiss, S. G. Tarrow.
An introduction to European societies, their development, and current dynamics. Topic for 1984–85: the formation of Europeans. Education, community, and culture in Western Europe, with an emphasis upon how concepts of identity, community, class, and culture are acquired by young Europeans and developed in the worlds of family, school, work, and politics. The course is designed for students with an interest in, or experience of, various European countries and who wish to increase their knowledge of Western Europe.

[352 The End of the Austro-Hungarian Monarchy, 1848–1919 Not offered 1984–85; next offered fall 1985.
M W 9:05; disc W 10:10 and W 1:25. I. V. Hull.
The decline and fall of the multinational empire. Emphasis is on the political and social problems presented to the monarchy both by industrialization and by the increasingly restive subject nationalities (Poles, Czechs, Serbs, Croats). How did the monarchy handle these problems? Why did it fail? Focus is on cultural matters. Readings are drawn from Freud, Schnitzler, Hofmannsthal, Karl Kraus, Joseph Roth, and others.]

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 Seventeenth and Eighteenth Centuries 4 credits. Not offered 1984–85.
T R 2:30–3:50. S. L. Kaplan.
A systematic examination of the social structure, economic life, political organization, and collective mentalities of a society that eclipsed all others in its time and then, brutally and irreversibly, began to age. France, in European perspective, from the wars of religion through the age of Voltaire.]

356 The Era of the French Revolution and Napoleon Spring. 4 credits.
T R 2:30–3:50. S. L. Kaplan.
A study of the failure of the traditional system, its dismantling and replacement in France, and the international consequences. Focus will be on the meaning of the revolutionary experience, the tension between the desires to destroy and to create, and the implications of the Revolution for the modern world.

[357 Survey of German History, 1648–1890 4 credits. Not offered 1984–85.
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 Spring. 4 credits. Open to freshmen.
M W 9:05; disc, W 10:10 and W 1:25. I. V. Hull.
The "German problem" is examined. Major topics include tensions caused by rapid industrialization presided over by a preindustrial, political elite; origins of World War I; growth of anti-Semitism; social dislocations of World War I; failure of the socialist revolution of 1918–19; unstable Weimar democracy and the rise of Nazism; the Nazi state; World War II; and the two Germanys.

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. Not offered 1984–85
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]

383–384 Europe in the Twentieth Century 383, fall; 384, spring. 4 credits each term. History 383 is not a prerequisite to 384.
M W 1:25, plus disc to be arranged. J. H. Weiss.
An investigation of the major developments in European history since 1900. Emphasis upon the development of democratic political systems and their alternatives. 383 topics include the reorientation of liberalism and democratic socialism, the transforming effects of war and depression, the dynamics and diplomacy of fascism, the European response to the economic and ideological influence of America and the Soviet Union, and the interaction between politics and social structure. 384 topics include the origins and course of the cold war in Europe, the emergence of welfare states, the movement for European unity, ethnic and regional movements, the crises of 1968, the end of dictatorship in Spain and the socialist experiment in France, and the politics of the arms race.

[**405 Population and History** 4 credits Seminar format. Open to sophomores. Not offered 1984–85.
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** 4 credits Open to upper-level undergraduates. Prerequisite: permission of instructor. Not offered 1984–85; next offered fall 1985.
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** 4 credits. Prerequisite: permission of instructor. Not offered 1984–85.
S. L. Kaplan.]

[**456 Seminar on Germany, 1890–1918** 4 credits. Prerequisite: permission of instructor. Not offered 1984–85.
I. V. Hull.
A consideration of the many paradoxes of the Wihelminian age—the last decades of the monarchy, as it wrestled with economic and social change.]

457 Seminar in European Fascism Spring. 4 credits. Prerequisite: permission of instructor.
M 1:25–3:25. I. V. Hull.
An attempt to define and understand the social, political, and intellectual origins, mechanisms, and goals of European fascist movements of the 1920s and 1930s by detailed study of German National Socialism, Italian Fascism, and the Action Française.

[**458 Seminar in Weimar and Nazi Germany, 1918–1945** 4 credits. Prerequisite: History 358 or permission of instructor. Not offered 1984–85.
I. V. Hull.
The political, economic, social, and cultural history of the Weimar Republic and the Third Reich are examined in depth.]

459 The Making of the English Ruling Class, 1660–1780 Spring. 4 credits.
R 2:30–4:30. D. A. Baugh.
Perspectives on the landed aristocracy's continuing domination of politics. Topics include the political system, political and social thought, aristocratic life-style, religion, crime and criminal justice, the Old Poor Law, land and commerce, the role of London, and relations with Scotland, Ireland, and America. Readings are drawn from both modern historians and eighteenth-century authors.

467 Seminar in Modern European Political History Spring. 4 credits. Prerequisite: History 383 or permission of instructor.
W 2:30–4:30. J. H. Weiss.
Topic for 1985: resistance, collaboration, and retribution in World War II. A study of the response of individuals, social groups, and political bodies to the extreme pressure of occupation, imprisonment, civil war, and Nazi extermination actions. The concluding section focuses primarily on the war-crimes trials at Nuremberg.

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 12:20–2:15. D. LaCapra.

[**476 Documenting the Depression: Film, Literature, and Memory** 4 credits. Prerequisite: permission of instructor. Not offered 1984–85.
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** 4 credits. Not offered 1984–85.
M 2:30–4:30. S. L. Kaplan.
An inquiry into the historical origins of European (especially French) political, social, and economic thought, beginning in the 1680s at the zenith of Louis XIV's absolutism and culminating in the French Revolution a century later. Emphasis is on the relationship of criticism and theory to actual social, economic, religious, and political conditions. An effort is made to assess the impact of enlightened thought on the eighteenth-century world and to weigh its implications for modern political discourse. Readings in translation from such authors as Bayle, Montesquieu, Voltaire, Rousseau, Diderot, etc., as well as from modern scholarly and polemical literature.]

[**478 Seminar in Eighteenth-Century French Social History** Not offered 1984–85.
S. L. Kaplan.]

480 Twentieth Century Britain Fall 4 credits.
M 2:30–3:20, W 2:30–4. D. A. Baugh.
Lectures focus on key personalities. Seminar topics include Ireland, the 1930s, the world wars and their impact, the decline of liberalism, the roots of Britain's economic problems, the decline of empire, the condition of the political parties, and the character of English society.

[**483 Seminar in Modern European Social History** Fall. 4 credits. Not offered 1984–85.
J. H. Weiss.]

[**655 Seminar in Eighteenth-Century British History** Not offered 1984–85.
D. A. Baugh.]

[**656 Seminar in Nineteenth-Century British History** Not offered 1984–85.
D. A. Baugh.]

[**671 Seminar in the French Revolution** Not offered 1984–85.
S. L. Kaplan.]

672 Seminar in European Intellectual History Fall. 4 credits.
W 12:20–2:15. D. LaCapra.

[**673 Seminar in European Intellectual History** Spring. 4 credits. Not offered 1984–85.
D. LaCapra.]

677 Seminar in Russian History Fall. 4 credits
Hours to be arranged. W. M. Pintner.

678 Seminar in Modern European Social History Fall. 4 credits.
Hours to be arranged. J. H. Weiss.
Research seminar. Topic: education, professional structures, and social stratification since 1800.

[**679 Seminar in European History** Not offered 1984–85.
S. L. Kaplan.]

Latin American History

295 Colonial Latin America Fall. 4 credits.
M W F 10:10. Staff.
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 1984–85.
T. H. Holloway.
The development of rural patterns of wealth, status, and power, focusing on the role of country people in the larger society. Topics include disruption of the conquest, evolution from *encomienda* to *hacienda*, rise of plantation agriculture and export enclaves, decline of Indian communities, peasant protest, and land reform and development programs of the recent past.]

348 Contemporary Brazil Spring 4 credits.
M W F 1 25. T. H. Holloway.
A study of the style of development in economy, policy, 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 are made with other Latin American countries. Readings in English.

449 Undergraduate Seminar in Latin American History Fall. 4 credits Prerequisite: permission of instructor.
M 2:30–4:30. Staff.
Topic to be announced.

[**649 Seminar in Latin American History** Not offered 1984–85.
T. H. Holloway.]

Honors and Research 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 2:30–4:30; D. Baugh. Spring: T 2:30–4:30; R. L. Moore.
An introduction to historical writing and modes of research, emphasizing the possibilities and limitations of historical inquiry.

401 Honors Research Fall or spring. 4 credits. Prerequisites: History 400 and permission of instructor

402 Honors Thesis 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.
Hours to be arranged. Staff.
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

The Ideology of Imperialism: The Augustan Age in Rome and England (Society for the Humanities 415–416) 415, fall; 416, spring. 4 credits.
W 1:30–3:10. L. Brown.

Napoleonic Town Planning (Society for the Humanities 423–424) 423, fall; 424, spring. 4 credits.
M 3:35–5:20. R. Becherer.

Florentine Art and Culture in the Age of Galileo (Society for the Humanities 425) Fall. 4 credits.
W 3:35–5:20. E. Ciletti.

Florentine Art and the Twilight of the Medici (Society for the Humanities 426) Spring. 4 credits
W 3:35–5:20. E. Ciletti.

Classicism in Early American Poetry: Adam and Aeneas (1516–1750) (Society for the Humanities 431) Fall. 4 credits.
T 3:35–5:20. J. Shields.

History of Art

A. Ramage, chairman and director of undergraduate studies; J. Bernstock, T. M. Brown, R. G. Calkins, E. G. Dotson, C. Lazzaro, T. W. Leavitt, L. L. Meixner, N. Neaher, S. J. O'Connor, 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, 11:15, or 1:25, or T R 12:20–1:35. Spring: M W F 9:05, 10:10, or 11:15, or T R 12:20–1:35. 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 or spring. 3 credits. Not open to students who have taken History of Art 103.
T R 12:20–1:35. Fall: J. Bernstock. Spring: N. Prendergast.
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 1984–85.
S. J. O'Connor.]

[107 Principles of Architecture 3 credits. Not offered 1984–85.
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 Fall. 3 credits.
M W F 9:05. N. Neaher.
The cultural foundations of art in sub-Saharan Africa, including a selected examination of masking traditions; royal arts; body aesthetics; figurative sculpture; architecture; and relationships with Western developments in art.

216 Introduction to Art History: The Arts of Africa, Oceania, and the Americas Spring. 3 credits.
M W F 9:05. N. Neaher.
A preliminary exploration of the arts of Africa, Oceania, and pre-Hispanic and native America, which will introduce students to visual themes and their cultural bases Case studies will illuminate issues such as the role of the artist in society, functional imperatives, aesthetic "systems," transformations in style, and exchanges in influence with art and culture of the West.

220 Introduction to Art History: Art of the Classical World (also Classics 220) Spring. 3 credits.
M W F 10:10. J. Coleman.
The archaeology of the ancient Greeks and Romans as seen from a critical perspective. Major developments in Classical archaeology will be traced, from treasure hunting to modern scientific research. Examples illustrating various approaches will be chosen: the sculpture, vase painting, and architecture of the ancient Greeks from the Geometric period through the Hellenistic, and the art of the Romans from the early Republic to the late Empire.

221 Introduction to Art History: Minoan-Mycenaean Art and Archaeology (also Classics 221) Fall. 3 credits.
M W F 10:10. J. Coleman.
The birth of civilization in Greece and the Aegean islands during the Bronze Age. The main focus is on the rise and fall of Minoan Crete and Mycenaean Greece, with consideration given to the nature and significance of Aegean interactions with Egypt, the Near East, and Anatolia. Topics also include Cyprus as an intermediary between the Aegean and the eastern Mediterranean, the effects of the volcanic eruptions of Santorini-Thera, and the evidence of Homer and the Greek myths.

[230 Introduction to Art History: Monuments of Medieval Art 3 credits. Not offered 1984–85.
R. G. Calkins.]

240 Introduction to Art History: The Renaissance Fall. 3 credits.
M W F 9:05; disc, M 1:25 or 2:30, or T 9:05 or 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. C. Lazzaro.
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 3 credits. Not offered 1984–85.
T. W. Leavitt]

[280 Introduction to Art History: Asian Traditions 3 credits. Not offered 1984–85.
S J. O'Connor]

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 4 credits. Not offered 1984–85]

[313 Books, Prints, and the Graphic Image 4 credits. Not offered 1984–85.]

[320 The Archaeology of Classical Greece (also Classics 320) 4 credits. Not offered 1984–85.
A. Ramage.]

[321 The Archaeology of Cyprus (also Classics 321) 4 credits. Not offered 1984–85.]

322 Arts of the Roman Empire (also Classics 322) Fall. 4 credits.
M W F 11:15. A. Ramage.
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.

[323 Painting in the Greek and Roman World (also Classics 323) 4 credits. Not offered 1984–85.]

[324 Architecture in the Greek and Roman World (also Classics 324) 4 credits. Not offered 1984–85]

325 Greek Vase Painting (also Classics 325) Spring. 4 credits.
M W F 11:15. A. Ramage.
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 Classics 326) 4 credits. Not offered 1984–85]

[327 Greek and Roman Coins (also Classics 327) 4 credits. Not offered 1984–85.
A. Ramage.]

[328 Greeks and Their Eastern Neighbors (also Classics 322) 4 credits. Not offered 1984–85.
J. Coleman.]

[329 Greek Sculpture (also Classics 329) 4 credits. Not offered 1984–85.
A. Ramage]

[330 Art in Pompeii: Origins and Echoes (also Classics 330) 4 credits. Not offered 1984–85.]

[332 Architecture in the Middle Ages (also Architecture 382) 4 credits. Not offered 1984–85.
R. G. Calkins.]

[333 Early Medieval Art and Architecture 4 credits. Not offered 1984–85.
R. G. Calkins.]

334 Romanesque Art and Architecture Fall. 4 credits.
M W F 12:20. R. G. Calkins.
The painting, manuscript illumination, sculpture, and architecture of the eleventh and twelfth centuries, primarily in France, England, and Spain. Particular attention will be paid to the art of the Pilgrimage Roads, the manifestation of specific regional styles, the problems of Byzantine influence, the significance of the art of the church treasuries, and the factors that brought about the transition to the early Gothic.

[335 Gothic Art and Architecture 4 credits. Not offered 1984–85.
R. G. Calkins.]

336 Prelude to the Italian Renaissance Fall. 4 credits.
M W F 9:05. R. G. Calkins.
Beginning with twelfth-century Sicily, with emphasis on thirteenth- and fourteenth-century Italian sculpture, painting, and, to a lesser extent, architecture, including the works of Duccio, Giotto, the Pisani, and the Lorenzetti, as the prelude to the Italian Renaissance.

[337 The Medieval Illuminated Book 4 credits. Not offered 1984–85.
R. G. Calkins.]

341 Flemish Painting Fall. 4 credits.
M W F 1:25. J. Wilson.
Painting in the transitional period from the late Gothic to the Renaissance in the Lowlands. The works of the Master of Flemalle, Jan van Eyck, and Jerome Bosch will be considered.

[342 Medieval and German Renaissance Art 4 credits. Not offered 1984–85.
R. G. Calkins.]

[343 Italian Renaissance Art of the Fifteenth Century 4 credits. Not offered 1984–85.]

[344 Italian Renaissance of the Sixteenth Century 4 credits. Not offered 1984–85.
C. Lazzaro.]

[345 Sculpture of the Italian Renaissance 4 credits. Not offered 1984–85.]

350 The Culture of the Early Renaissance (also History 361 and Comparative Literature 361) Fall 4 credits.
T R 1:25–2:15; one disc, to be arranged.
C. Lazzaro, J. Najemy.
Renaissance culture is introduced through six major figures: Petrarch, Alberti, Machiavelli, Leonardo, Erasmus, and Rabelais. Each figure will be the focal point for the critical examination of problematic issues in the areas of humanism, religious and political thought, literature, art, and architecture. In the discussion sections problems of interpretation will be approached through the analysis of primary source readings and works of art.

351 The Culture of the Later Renaissance (also History 364 and Comparative Literature 364) Spring. 4 credits.
T R 1:25–2:15; one disc, R 2:30 or F 1:25 or 2:30.
E. Dotson, C. Kaske, with C. Arroyo, C. Holmes, J. Najemy, E. Morris.
Although History of Art 350 (History 361 and Comparative Literature 361) is not a prerequisite, this course continues its organization and deals with the immediately succeeding period. Members of several departments will lecture on Luther, Michelangelo, Durer, Montaigne, Edmund Spenser, Bodin, Cervantes, and Galileo. Lectures and discussion will undertake close reading of texts, literary and visual, and will present methods of interpretation and of historical analysis.

352 Dutch Painting of the Seventeenth Century Fall. 4 credits. Limited to 40 students.
T R 10:10–11:25; disc to be arranged. C. Lazzaro.
A study of the flourishing of painting in seventeenth-century Holland, with emphasis on the major artists—Rembrandt, Hals, Vermeer—and on the traditions of still-life, genre, and landscape painting. Context and content as well as stylistic development will be considered.

[355 French Art of the Sixteenth and Seventeenth Centuries 4 credits. Not offered 1984–85.
E. G. Dotson]

[357 European Art of the Eighteenth Century 4 credits. Not offered 1984–85.
E. G. Dotson.]

[359 Major Masters of the Graphic Arts 4 credits Not offered 1984–85.
C. Lazzaro]

361 Nineteenth-Century European Art Spring. 4 credits.
M W F 11:15. L. Meixner.
A survey of the major movements in nineteenth-century art history: neoclassicism, romanticism, realism, impressionism, postimpressionism, and symbolism. The primary artists discussed include Jacques-Louis David, Eugene Delacroix, Francisco Goya, Caspar D. Friedrich, Joseph W. M. Turner, Claude Monet, Vincent van Gogh, and Paul Gauguin. Literary and political developments are examined with respect to the broader cultural contexts of the specific art movements.

362 European Art 1900–1940 Spring. 4 credits
T R 10:10–11:25. J. Bernstock.
A survey of the major movements in European art in the first half of the twentieth century: Fauvism, German expressionism, cubism and its satellite schools, dada, and surrealism. Emphasis will be placed on a few artists, such as Matisse, Picasso, Kandinsky, and Duchamp. The course will consider the styles and philosophies of the artists, as well as the cultural milieus within which they worked.

[364 American Art 1900–1940 4 credits. Not offered 1984–85]

365 Art from 1940 to the Present Fall 4 credits.
T R 8:40–9:55. J. Bernstock.
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.
P. Scott.
A historical and critical survey of the architecture of Washington. Attention will be given to the periods, styles, architects, and clients—public and private—of

the notable buildings and to the 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 1984–85.
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 Technics: 1850–1950 Fall. 4 credits. Limited to 30 students.
T R 12:20–1:35 T. M. Brown.
Approached topically, an examination of the issues of two- and three-dimensional visual art and design within the context of an industrial democracy. Discussion will revolve around topics presented, as well as required weekly reading.

380 Introduction to the Arts of China Fall. 4 credits.
M W 10:10; 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 1984–85.
S. J. O'Connor.]

[383 The Arts of Early China 4 credits. Not offered 1984–85.
M. W. Young.]

[384 The Arts of Japan 4 credits. Not offered 1984–85.
M. W. Young.]

[385 Chinese Painting 4 credits. Not offered 1984–85.
M. W. Young.]

[386 Studies in Indian and Southeast Asian Art 4 credits. Not offered 1984–85.
S. J. O'Connor.]

396 The Arts in Southeast Asia Spring. 4 credits.
T R 10:10. S. J. O'Connor.
The arts of Southeast Asia will be studied in their social context, since in traditional societies art plays a role in most of the salient occasions of life. Special emphasis will be devoted to developments in Cambodia, Thailand, and Bali. Among topics covered will be the shadow-puppet theatre of Java, ceramics, architecture, and sculpture.

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.

[404 Women Artists 4 credits Not offered 1984–85.
J. Bernstock.]

[405 Original Works of Art 4 credits. Not offered 1984–85]

[406 Introduction to Museums 2 credits. Not offered 1984–85.
T. W. Leavitt.]

407 Seminar on Museum Issues Spring. 4 credits.
T 2:30–4:30. T. W. Leavitt.
This course will explore the issues, ideas, problems, and opportunities faced by art museums in contemporary American society. The nature of museum research, theory of museum education, connoisseurship, effective museum leadership, and the roles of art museums in American cultural life will be discussed. The course will use as a basic reference the report of the Commission on Museums for a New Century, published by the American Association of Museums in September 1984. Students will present research papers in the course on relevant topics suggested by the findings and recommendations in the report.

[421 History of Art Criticism 4 credits. Not offered 1984–85]

[423 Ceramics 4 credits. Not offered 1984–85.
A. Ramage.]

431 Greek Sculpture (also Classics 431) Fall. 4 credits.
T 2:30–4:30. A. Ramage.
Study of ancient Greek sculpture techniques and achievements in marble and bronze. Detailed examination of a selection of works to illustrate sculptural development. What we know of the Greeks' own theories will be a main theme.

[437 The Medieval Illuminated Book 4 credits. Not offered 1984–85.
R. G. Calkins.]

[448 Mannerism and the Early Baroque Era in Italy 4 credits. Not offered 1984–85.
E. G. Dotson]

449 Studies in Italian Renaissance Art Spring. 4 credits.
M 2:30–4.30. C. Lazzaro.
Topic for 1985 to be announced.

[450 Bernini and the Baroque 4 credits. Not offered 1984–85.
J. Bernstock.]

[452 Studies in English Art 4 credits. Not offered 1984–85.]

[456 Literature and the Arts in Sixteenth-Century France (also French 456) 4 credits. Not offered 1984–85.
E. G. Dotson, E. P. Morris.]

458 Classic and Romantic Art Fall. 4 credits.
W 2:30–4:30. E. G. Dotson.
Topic for 1984: the art of the Revolutionary period.

463 Studies in Modern Art Fall. 4 credits.
R 2:30–4:30. L. Meixner.
Topic for 1984: Marcel Duchamp and his influence in America.

464 Studies in Modern Art Spring. 4 credits.
R 2:30–4:30. J. Bernstock.
Topic for 1985: the figure in art since 1940.

465 Problems in Modern Art and Architecture Spring. 4 credits. Limited to 15 students. Prerequisite: permission of instructor.
M 12:20–2:20. T. M. Brown.
Topic for 1985 to be announced.

[474 American and European Decorative Arts from the Renaissance Period to the Early Nineteenth Century 4 credits. Not offered 1984–85.]

[475 The Earliest Arts in Colonial America: The Seventeenth Century 4 credits. Not offered 1984–85.]

476 Seminar in American Art Spring. 4 credits.
W 2:30–4:30. L. Meixner.
Topic for 1985: Civil War genre painting. The seminar will trace the development of genre painting in America with special attention to its full flowering during the Civil War era. The primary artists involved include John Quidor, Lily Martin Spencer, George C. Bingham, Richard C. Woodville, William Sidney Mount, Thomas Eakins, Winslow Homer, and their contemporaries.

[481 The Arts in Modern China 4 credits. Not offered 1984–85.
M. W. Young.]

482 Ceramic Art of Asia Spring. 4 credits.
W 2:30–4:30. S. J. O'Connor.
The Herbert F. Johnson Museum's collection of Asian ceramics will provide a principal resource of study. Lectures, reports, and discussions.

483 Chinese Art of the T'ang Dynasty Spring. 4 credits. Prerequisites: History of Art 380, or a course in Chinese history or Chinese literature, or permission of instructor.
M 2:30–4:30. M. W. Young.
A detailed examination of the arts in medieval China, with particular attention to arts of the T'ang court, the international style of the seventh and eighth centuries, and the Buddhist tradition in painting and sculpture. Some meetings will be held in the Herbert F. Johnson Museum of Art. Final paper expected.

[486 Studies in Chinese Painting 4 credits Not offered 1984–85
M. W. Young.]

[488 Traditional Arts of Southeast Asia 4 credits. Not offered 1984–85.
S. 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 1984–85.
A. Ramage.]

531 Problems in Medieval Art and Architecture Fall. 4 credits.
M 2:30–4:30. R. G. Calkins.
Topic for 1984: methods of medieval art and architecture. An investigation of various approaches to the study and analysis of medieval architecture. Weekly readings, discussions, and a final research paper.

[540 Seminar in Renaissance Art 4 credits Not offered 1984–85.
E. G. Dotson.]

[550 Seminar in Baroque Art 4 credits. Not offered 1984–85
C. Lazzaro.]

[564 Problems in Modern Art: Post-1940 American Art 4 credits. Not offered 1984–85.]

[580 Problems in Asian Art 4 credits. Not offered 1984–85.
S. J. O'Connor]

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 1984–85]

[595 Methodology Seminar II 4 credits Not offered 1984–85.
R. G. Calkins]

[596 Problems in Art Criticism 4 credits. Not offered 1984–85.
S. J. O'Connor.]

Related Courses in Other Departments

The Art of Science: Relations between the Two Cultures (Chemistry 205) Fall.

Napoleonic Town Planning (Society for the Humanities 423–424) 423, fall; 424, spring

Florentine Art and Culture in the Age of Galileo (Society for the Humanities 425) Fall.

Florentine Art and the Twilight of the Medici (Society for the Humanities 426) Spring.

Allegory, Representation, and the Visual Arts (Society for the Humanities 428) Spring

Nature in Literature and Science (Comparative Literature 448–449) 448, fall; 449, spring.

See also courses listed under Classics.

Indonesian

See Modern Languages, Literatures, and Linguistics, p. 165.

FALCON Program:

J. U. Wolff, 307 Morrill Hall, 256-4864.

Italian

See Modern Languages, Literatures, and Linguistics, pp. 165–167.

Japanese

See Department of Asian Studies, p. 112, and Modern Languages, Literatures, and Linguistics, pp. 167–168.

FALCON Program:

E. Jorden, 321 Morrill Hall, 256-6457.

Javanese

See Modern Languages, Literatures, and Linguistics, p. 168.

Latin

See Department of Classics, pp. 121–122.

Linguistics

J. W. Gair, director of undergraduate studies (407 Morrill Hall, 256-5110).

See Modern Languages, Literatures, and Linguistics, pp. 168–170.

Mathematics

A. Nerode, chairman; I. Berstein, L. Billera, J. Bramble, K. Brown, L. Brown, S. Chase, M. Cohen, R. Connelly, R. Dennis, E. Dynkin, C. Earle, R. Farrell, 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, W. Lok, R. Lubarsky, M. Morley (associate chairman and director of undergraduate studies, 216 White Hall, 256-4105), 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, and 192. (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 213–231, normally with grades of B+ or better.

Requirements

There are five requirements for the major:

1) Computer Science 100. Students are urged to take this course before the end of the sophomore year.
2) Two courses in algebra. Eligible courses are Mathematics 431 or 433, 432 or 434 or 332, 336.
3) Two courses in analysis. Eligible courses are Mathematics 411 or 413, 412 or 414, 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, 410, 414, 421, 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 111–112–213–231, 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)–112–213
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.

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 terminal sequence. It does not fulfill the mathematics requirement for biology majors.)	107–108
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 213. 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
112, 122, and 192
213 and 293
213 and 294
213 and 222
221, 294, and 231
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. 2, Nov. 6, Nov. 29.
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., Feb. 21, Mar. 21, Apr. 23.
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.*
Lecs, T R 12:20, plus 2 hours to be arranged.
Prelims: 7:30 p.m., Sept. 20, Oct. 25, Nov. 27.
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

*See the list of courses with overlapping content at the end of the introduction.

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., Feb. 21, Mar. 21, Apr. 23.

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: lecs, M W F 11:15 or 12:20, plus 2 hours to be arranged. Spring: lecs, M W F 11:15, plus 2 hours to be arranged. Prelims: fall, 7:30 p.m., Oct. 4, Nov. 1, Nov. 29; spring, 7:30 p.m., Feb. 19, Mar. 29, Apr. 23.

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 213.*

Fall: lecs, M W F 11:15, plus 2 hours to be arranged. Spring: lecs, M W F 10:10, 11:15, 12:20, plus 2 hours to be arranged. Prelims: fall, 7:30 p.m., Oct. 4, Nov. 1, Nov. 29; spring, 7:30 p.m., Feb. 19, Mar. 19, Apr. 23.

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. 4, Nov. 1, Nov. 29

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 213 are advised to take 112 instead of this course.*

Fall: M W F 10:10, 11:15, or 12:20. Spring: M W F 11:15 or 12:20. Prelims: Oct. 4, Nov. 1, Nov. 29.

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. 4, Nov. 1, Nov. 29.

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. 4, Nov. 1, Nov. 29; spring, 7:30 p.m., Feb. 19, Mar. 19, Apr. 23.

Methods of integration, polar coordinates, vectors and parametric equations, vector functions of one variable, infinite series, complex numbers, introduction to partial derivatives.

213 Calculus Fall, spring, or summer. 4 credits. Prerequisite: Mathematics 112, 122, or 192.

Lecs, M W F 10:10, plus 2 hours to be arranged. Prelims will be given some evenings at 7:30 p.m.

Simple first- and second-order equations with applications; series solutions. Systems of differential equations, elementary partial differential equations, and boundary-value problems. Introduction to numerical methods. Vectors, vector-valued functions, line integrals. Multivariable calculus.

221 Linear Algebra and Calculus Fall or spring 4 credits. Prerequisite: Mathematics 122 with a grade of B or better, or permission of instructor.

Fall: M W F 9:05, 10:10, or 11:15. Spring: M W F 10:10 or 11:15. Prelims: Sept. 25, Nov. 1, Nov. 29.

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. Prelims: Sept. 25, Nov. 1, Nov. 29.

Vector differential calculus, calculus of functions of several variables, multiple integrals.

293 Engineering Mathematics Fall or spring. 3 credits. Prerequisites: Mathematics 192 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. 25, Nov. 1, Nov. 29; spring, 7:30 p.m., Feb. 28, Mar. 26, Apr. 30.

Partial derivatives, multiple integrals, first- and second-order ordinary differential equations with applications in the physical and engineering sciences.

293 C Engineering Mathematics with Microcomputers Fall. 3 credits. Enrollment limited. Prerequisite: Mathematics 192.

Lecs, M W 10:10; rec, F 9:05, 10:10, or 11:15. 4 labs during semester.

Same topics as Mathematics 293, Engineering Mathematics, but with four microcomputer experiments using computer algebra to solve problems.

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. 25, Nov. 1, Nov. 29; spring, 7:30 p.m., Feb. 28, Mar. 26, Apr. 30.

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.

294 C Engineering Mathematics with Microcomputers Spring. 4 credits Prerequisite: Mathematics 293.

3 lecs, 1 rec; 4 labs during semester.

Same topics as Mathematics 294, Engineering Mathematics, but with four microcomputer experiments using computer algebra to solve problems.

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 1984–85.

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 213 and 231. Graduate students who need mathematics extensively in their work and who have had a solid advanced calculus course and complex variables course as undergraduates should take Mathematics 515–516. With less preparation, they should take Mathematics 421–422–423.

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 Fall, 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 or spring. 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. Not offered 1984–85.

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

*See the list of courses with overlapping content at the end of the introduction.

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.
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.

413–414 Introduction to Analysis 413, fall; 414, spring. 4 credits each. Prerequisite: Mathematics 222.
T R 8:40–9:55.
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 213. 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. 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.

*See the list of courses with overlapping content at the end of the introduction.

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 usually chosen from the following topics: partially ordered sets, lattices, graph theory, and Boolean algebras; finite machines and languages; applications of groups, fields, and modular arithmetic, such as Latin squares, elementary coding theory, or fast Fourier transform; difference equations. Additional topics may be chosen by the instructor.

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.

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.
Fall: M W F 11:15. Spring: M W F 9:05.
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 will 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 9:05. 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 Fall. 4 credits. Prerequisite: Mathematics 472 or 574.
M W F 11:15.
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 221.
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 4 credits. Prerequisites: Mathematics 511 and 531. Intended for graduate students in the mathematical sciences. Not offered 1984–85.
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 Topics in Analysis Fall.

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 Not offered 1984–85
Basic theory of ordinary differential equations.]

519–520 Partial Differential Equations
Basic theory of partial differential equations.

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. Not offered 1984–85.
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 Lie Groups and Differential Geometry Fall

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 Cr 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 1984–85
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. Not offered 1984–85.
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 1984–85.]

577 Nonparametric Statistics Fall. Prerequisite: a course in mathematical statistics such as Mathematics 574.
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

[613 Functional Analysis Fall. Not offered 1984–85.
Topological vector spaces. Banach and Hilbert spaces, Banach algebras. Additional topics to be selected by instructor.]

615 Fourier Analysis Spring.

[622 Riemann Surfaces Not offered 1984–85.]

[623 Several Complex Variables Not offered 1984–85.]

627 Seminar in Partial Differential Equations Fall.

631–632 Seminar in Algebra 631, fall; 632, spring.

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 Fall.

639 Topics in Algebra II Fall.
Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.

640 Homological Algebra Spring.

651–652 Seminar in Topology

653–654 Algebraic Topology 653, fall; 654, spring.
Duality theory in manifolds, applications, cohomology operations, spectral sequences, homotopy theory, general cohomology theories, categories and functors.

657–658 Advanced Topology
Selection of advanced topics from modern algebraic, differential, and geometric topology. Course content varies.

[661–662 Seminar in Geometry Not offered 1984–85.]

[667 Algebraic Geometry Not offered 1984–85.]

[670 Topics in Statistics Not offered 1984–85.
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 1984–85.]

675 Statistical Decision Theory Spring.

677 Stochastic Processes

681–682 Seminar in Logic

683 Model Theory Spring.

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 1984–85.
Topics in metamathematics. Course content varies.]

[687 Set Theory Spring. Not offered 1984–85.
Models of set theory. Theorems of Godel 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, R. Jones, E. Jorden, G. Kelley, H. Kufner, R. Leed, S. McConnell-Ginet, J. McCoy, G. Messing, C. Rosen, D. Sola, 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.

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. 168–170). 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.
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.
L. Mangione, 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.

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 10:10. 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 1984–85.
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.
Hours to be arranged. L. Mangione.
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.
Hours to be arranged. L. Mangione.
Syntax of modern Mandarin Chinese.

[**405 Chinese Dialects** Fall or spring, according to student demand. 4 credits. Prerequisite: permission of instructor. Not offered 1984–85.
Hours to be arranged. J. McCoy.
Introductory survey of modern dialects and their distinguishing characteristics.]

411–412 Readings in Modern Chinese 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. Not offered 1984–85.
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.
L. Mangione and staff.
Foreign language requirement: Proficiency is attained by passing 161.

Literature

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 F 11:15. 214: hours to be arranged.
Staff.

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)

English

Intensive English Program, see p. 218.

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.

209 English as a Second Language Fall or spring. 1 credit. Prerequisite: placement by instructor.
Hours to be arranged. M. Martin.
Practice in informal conversational English. Pronunciation, techniques for gaining information, informal conversation, and classroom speaking. Students also practice giving informal presentations. Personal conferences with the instructor supplement class work.

210 English as a Second Language Spring. 1 credit. Prerequisite: placement by instructor.
Hours to be arranged. M. Martin.
Practice in academic speaking. Formal classroom discussion techniques and presentation of information in various forms. Personal conferences supplement class work.

211–212 English as a Second Language 211, fall or spring; 212, spring. 3 credits each term. Prerequisite: placement by the instructor.
211: M W F 10:10, 11:15, 2:30; T R 2:30–4. 212: M W F 9:05, 11:15; 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

N. Furman, chairman; J. Bereaud (director of undergraduate studies, 265 Goldwin Smith Hall, 256-6407), A. M. Colby-Hall, D. I. Grossvogel, R. Klein, P. Lewis, E. P. Morris, J. S. Noblitt, A. Seznec, S. Tarrow, L. R. Waugh, A. Zaenen

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 Bereaud, 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 concerning the history of French (e.g., French 401, Romance Linguistics 321) and one course concerning the structure of French (e.g., French 408, 410, or 602).

2) The successful completion of two courses (preferably a sequence) in some allied area, for example, (a) French literature and civilization, (b) psycholinguistics, (c) philosophy of language.

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 spread over 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. For literature majors, the junior tutorial (ordinarily two terms) will be devoted to intensive study of selected problems of 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. For linguistics majors, honors work in French linguistics will be supervised by Professor Waugh; normally, honors work is done in the senior year.

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 R 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.

Note: Students placed in 200-level courses have the option of taking language and/or literature courses; see listings under "Literature" for descriptions of the literature courses, any of which may be taken concurrently with the 200, 203–204, or 211–212 language courses described below.

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 11:15, 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 Cornell 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 2:30; drills, M W F 9:05, 10:10, 11:15, 12:20, or 1:25. A. Zaenen
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. N. Furman 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 equivalence on the Cornell Advanced Standing Examination (CASE) offered by the Department of Romance Studies. Taught in French.
M W F 10:10 or 1:25. N. Furman 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 Advanced Standing Examination (CASE).
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. Staff.
This course is based on audiovisual 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 Cornell Advanced Standing Examination (CASE) offered by the Department of Romance Studies.
M W F 10:10, 12:20, or 1:25. J. Bereaud 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 Cornell Advanced Standing Examination (CASE).
M W F 10:10 or T R 10:10–11:25. 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. Not offered 1984–85; next offered 1985–86.
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. Not offered 1984–85.
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.
Hours to be arranged. 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.
Hours to be arranged. L. R. Waugh.
Introduction to French semantic elements—morphological, lexical and syntactic—from a functional perspective.

[424 Composition and Style Spring. Not offered 1984–85.]

[602 Linguistic Structure of Old and Middle French Spring. 4 credits. Prerequisite: French 408 or permission of instructor. Offered alternate years. Not offered 1984–85; next offered 1985–86.
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 1984–85.
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 1984–85]

109 Freshman Seminar: Techniques of Interpretation: An Introduction to Semiotics (also Romance Studies 109) Fall or spring 3 credits.
M W F 9:05. Staff.
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, 12:20, or 1:25, or T R 12:20–1:35. R. Klein 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, Mallarme, 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; P. Lewis and staff. Spring: M W F 12:20 or T R 12:20–1:35; A. Berger and staff.
Study of the classic literature of seventeenth-century France (Corneille, Racine, Moliere, Madame de Lafayette) and its immediate forebears (Montaigne) and successors in the Enlightenment (Voltaire, Rousseau, Diderot, Beaumarchais).

309 Mystery and the Mystery Story (also Comparative Literature 309) Fall. 4 credits.
M W F 10:10. D. Grossvogel.
Why do we read mystery novels? Are they really concerned with mystery? Are they fit material for an academic curriculum? These and other questions will be raised through the reading of certain writers of mystery stories like Agatha Christie and Georges Simenon, as well as through that of others like Borges and Kafka, who wrote tales of detection that secrete an entirely different kind of mystery.

320 French Civilization Fall. 4 credits. Prerequisite: proficiency in French (Typically taken after French 203 or 211). Conducted in French.
M W F 11:15. J.Bereaud.
Study of contemporary France: the country, its institutions, culture, and attitudes. Students will be expected to research one topic for paper or oral presentation. Viewing and discussion of some films.

[330 French Philosophical Readings of Jean Genet (also French 530) Not offered 1984–85]

[331 Masterpieces of French Drama I: The Classical Era Fall. Not offered 1984–85.]

332 Masterpieces of French Drama II: The Modern Era Spring. 4 credits.
T R 8:40–9:55. D. Grossvogel.
The history of French theater is followed from romanticism to the present, with emphasis on theatrical experiments in the twentieth century. Plays to be studied will be chosen from works by such authors as Hugo, Musset, Vigny, Dumas, Claudel, Giraudoux, Cocteau, Sartre, Beckett, Ionesco, and Genet.

[334 The Novel as Masterwork Spring. Not offered 1984–85.]

[335 Romance to Revolution: The French Novel before 1789 Not offered 1984–85]

337 French Poetry from Its Origins to the Revolution of 1789 Fall. 4 credits. Conducted in French.
T R 12:20. E. Morris.
French lyric poetry probably sprang up before the year 1000. It flourished and spread from the twelfth century through the sixteenth; was nearly stamped out by Richelieu and Louis XIV; burgeoned again amidst the songs and confusions of the Terror. This course will attempt to tell that story. Topics will include the changing place of verse in the culture, bounded by prose on the one hand and music on the other; history of verse forms and genera; theories of poetry as frenzy and as craft; poetry as a threat to the state; muffling, imprisonment, exile, and decapitation. Focus on five major figures: Machaut, Villon, Ronsard, La Fontaine, Chenier. Close reading of poetic texts.

[358 Gustave Flaubert Not offered 1984–85]

362 Poems, Institutions, and Other Fictions in the Realm of Francis the First (also History 362) Spring. 4 credits. Enrollment limited to 15 students. Prerequisite: permission of either instructor.
T R 2:30–3:45 L. Carrington, E. Morris.
Life and letters in France from 1515 to 1547. This interdisciplinary course will be organized around such historical topics as kingship, warfare and diplomacy, printing and literacy, the rebirth of classical learning, religious reformation, and so on, and around the works of such writers as Marot, Rabelais, Calvin, Francis the First (himself an accomplished poet) and Francis's sister Marguerite de Navarre. Other readings in chronicles and memoirs and in modern historians and literary critics. Consideration of recent reevaluations of theory and methodology in literary and historical scholarship. Reading knowledge of French useful but not indispensable.

[369 Comic Theater in the Seventeenth Century Not offered 1984–85.]

370 Perspectives on the Age of Enlightenment Fall. 4 credits. Conducted in French.
M W F 1:25. A. Berger.
Introduction to major eighteenth-century authors, such as Laclos, Montesquieu, Marivaux, Voltaire, Diderot, Rousseau, and Beaumarchais and reevaluation of their works in the light of recent developments in literary theory (e.g., feminism, deconstruction, semiotics).

[385 Experimental and Contemporary French Novels: Subversion of the Novelistic Genre from Diderot to the Present Fall. Not offered 1984–85.]

[388 The French Lyric Romance from Symbolism to Surrealism Spring. Not offered 1984–85.]

[389 French Romanticism Not offered 1984–85]

[390 Modern French Criticism (also French 690) 4 credits. Taught in French. Not offered 1984–85.]

395 Camus and His Contemporaries Spring 4 credits. Conducted in French.
M W F 1:25. S. Tarrow.
The years 1936–56 were years of political and social crisis in Western Europe. The impact of that crisis on the fiction of leading French writers will be studied in readings from Camus, Malraux, Sartre, De Beauvoir, Sarraute, Duras, and Celine. Discussion will center on such topics as the influence of existentialist thought; Marxism versus humanism; varieties of experimentation in narrative structures; recurrent themes of rebellion, revolution, racism, and civil war; and the critical reception of the texts.

[396 The Contemporary French Novel: 1950 to the Present Spring. 4 credits. Not offered 1984–85]

399 The Roots of Modernism in France, 1898–1924 Spring. 4 credits.
M W F 11:15. R. Klein.
The aim of this course is to survey the period in France from the first production of Alfred Jarry's avant-garde experiment, *Ubu Roi*, to the publication, by Andre Breton, of the *First Surrealist Manifesto*. It is in this period that one has begun to locate the roots of what is now being called *modernism:* the artistic and critical representation of the historical disintegration of the notion of a unified bourgeois self and of a coherent cultural community with its hierarchies of genres and styles. At the center of that period of turbulence is the experience of the First World War, whose power, in anticipation and in retrospect, to shape a newly "modern" consciousness we will try to judge through the perspective of some exemplary texts. They will include, beside the works of Tzara and the dadaists, some of Proust, Gide, Radiguet, Apollinaire, Valery, Picasso, Max Jacob, Jean Cocteau, Colette, Barres, Soupault, Breton, and Jarry.

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.

424 Composition and Style Spring. 4 credits. Class conducted in French.
T R 10:10–11:25. J. Bereaud.
Designed for graduate students and undergraduates who have done French 312 or equivalent. The course will have two parts: a practical study of stylistics (involving recognition of major rhetorical figures of speech and the practice of *explication de texte* as oral exposes by students) and a high-level language component based upon the study and practice of translation and the writing of texts in different styles.

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. Not offered 1984–85.]

[452 Theatre in Sixteenth-Century France Spring. Not offered 1984–85.]

[457 Rabelais Not offered 1984–85]

[458 Montaigne Spring. Not offered 1984–85.]

[461 The Theater of Moliere Fall. Not offered 1984–85.]

[473 Diderot and the Enlightenment Fall. Not offered 1984–85.]

[**485 Reading Workshop: The Short Story** Not offered 1984–85.]

493 French Feminisms (also Women's Studies 493) Fall. 4 credits. Taught in English.
T R 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.

596 Colette: Can She Be a Subject of Masculine Discussion In 1985? Spring. 4 credits.
T 2:30–4:25. D. Grossvogel.
From her first writings under the tutelage of her husband, Willy, to her emergence as one of the most important authors in the first half of the century, Gabrielle Colette's story is one of both emancipation and of a particular sensitivity that allowed critics to praise her as the greatest of all French women writers. Her life and writings thus raise questions about gender, narrative voice, sexual roles, and the like—questions that are very much with us today and add to the complexity of any attempt at this kind of analysis.

607–608 The Interpretation of Texts 607, fall; 608, spring. 4 credits each term. Prerequisite: fluency in French. Required of first-year graduate students.
R 4:30–6:30 p.m. Fall: R. Klein; spring: P. Lewis.
This seminar will introduce graduate students to a wide variety of approaches to analyzing and interpreting literary texts, and to some associated problems of literary history and theory. Each of the weekly sessions will be oriented by a reading assignment, in some cases primary texts that will be the object of critical analysis, in other cases historical or critical writings germane to the week's topic. Students will be expected to write an interpretative essay exemplifying a critical approach of their choice at the end of each term. Many, if not all, of the meetings will be organized around the presentation of an interpretation by a visitor, who will often be a guest from another university. On some occasions a member of our own community of faculty and graduate students will be called upon to conduct the seminar. The course director will organize and publicize the series of seminars, preside over introductory and concluding class meetings, conduct any sessions of the course not covered by visitors, and direct critical writing undertaken by the students.

[**637 Old French Dialectology** Fall. Not offered 1984–85]

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 1984–85]

[**646 Medieval Seminar: Villon** Spring. Not offered 1984–85]

[**648 Medieval Seminar: *La Roman de la Rose*** Spring. Not offered 1984–85.]

[**660 The Moralist Tradition** Fall. 4 credits. Not offered 1984–85]

[**661 Racine and His Critics** Not offered 1984–85.]

662 Racine Fall. 4 credits. Conducted in French.
M 2:30–4:25. P. Lewis.
Racine's plays will be read in chronological order; extracts from his other works will be considered occasionally, in relation to the theater. The principal emphasis will fall upon four major tragedies—*Andromaque, Britannicus, Iphigenie,* and *Phedre*—to which two full sessions will be accorded. Discussion will address diverse critical interpretations of the Racinian corpus and of these four plays, including phenomenological (Starobinski), psychoanalytic (Mauron and Doubrovsky), semiotic (Pavel), structuralist (Barthes), sociological (Goldmann), theatrical (Scherer), and thematic (Hubert) perspectives.

[**666 Seventeenth-Century Seminar: Moralities In Fiction: The Classical Moment (also Comparative Literature 666)** Not offered 1984–85]

[**669 Seventeenth-Century Seminar: Illusion and Representation** Not offered 1984–85
P. Lewis]

[**688 Gerard de Nerval** Spring. 4 credits. Not offered 1984–85]

[**689 Bohemians and Dandies** Not offered 1984–85]

Related Courses in Other Departments

Stendhal, Balzac, Flaubert (Comparative Literature 480) Spring.

Germanic Studies

E. A. Blackall, B. Buettner, 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, H. L. Kufner (director of undergraduate studies [language], 211 Morrill Hall, 256-4230), C. A. Martin, P. W. Nutting, R. Ruppel, M. Totten, 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, Society for the Humanities, Theatre Arts, and Women's Studies, many of which complement the course offerings in German.

Students majoring in German are expected to become competent in the German language. This competence is normally demonstrated by the successful completion of German 304. Placement of German majors who have done no work in German at Cornell will be determined by the level of preparation they have obtained elsewhere. For information, students should consult the major advisers, H. Deinert or H. L. Kufner.

Study Abroad

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 107, 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. Augsberger.

401 Introduction to Germanic Linguistics Fall. 4 credits. Prerequisite: Linguistics 101 or permission of instructor. Offered alternate years.
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.
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 1984–85.
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 1984–85.
Hours to be arranged. H. L. Kufner.
Survey of German dialects, the work done at the *Sprachatlas*, and a discussion of modern approaches to dialectology.]

[406 Runology Fall. 4 credits. Prerequisite: German 401. Not offered 1984–85.
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. Not offered 1984–85.
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.
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 1984–85.
Hours to be arranged. W. E. Harbert.
Linguistic structure of Gothic, with extensive readings of Gothic texts.]

603 Old Saxon, Old High German Fall 4 credits. Prerequisite: Linguistics 102. Offered alternate years.
Hours to be arranged. F. van Coetsem.

604 Old Low Franconian, Old Frisian Spring 4 credits. Prerequisite: Linguistics 102. Offered alternate years.
Hours to be arranged. F. van Coetsem.

605 Structure of Old English Fall. 4 credits. Prerequisite: German 401.
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. Not offered 1984–85.
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 1984–85.
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 1984–85.
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. Fall: J. Harris; spring: T. Hill.
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.
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 1984–85.
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.
Hours to be arranged. Staff.

720 Seminar in Comparative Germanic Linguistics Fall or spring, subject to the needs of students and to the limitations of staff time. 4 credits.
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 the limitations of staff time. 4 credits.
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.
Hours to be arranged. F. van Coetsem.
Selected topics including the history, structure, and dialects of modern Dutch.

Literature

Freshman Seminars

107 Growing Up in Germany: Adolescence and Young Adulthood in the Literature Fall. 3 credits.
M W F 11:15. M. Totten.
Most of the works we will read depict the problems of growing up in middle-class society: the conflicts between the young hero's desires and the demands and restraints imposed by the world around him or her. Two works from East Germany will cast a different light on our topic. They focus not only on the painfulness of adolescence but also on the growth of a sense of social responsibility. The works to be read range from early in the century to the present. Readings will include Robert Musil, *Young Törless;* Thomas Mann, *Tonio Kröger;* Hermann Hesse, *Demian;* Franz Kafka, "Letter to His Father;" Günter Grass, *Cat and Mouse;* Ulrich Plenzdorf, *The New Sufferings of Young W.;* Christa Wolf, *A Model Childhood;* Wedekind, *Spring Awakening*.

109 Folk Tales and Folk Poetry Fall and spring. 3 credits each term.
M W F 8, 10:10, or 12:20, 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 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; C. A. Martin and staff. Spring: M W F 12:20; P. W. Nutting.
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 credits each term. Prerequisite: German 201 or permission of instructor. Taught in German.
Fall: M W F 1:25, C. A. Martin. 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 12:20–1:35. P. U. Hohendahl.
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 Not offered 1984–85]

[355 The Age of Goethe Not offered 1984–85]

356 Goethe's *Faust* Fall. 4 credits. Prerequisite: German 201–202 or permission of instructor.
M 2:30–4:30. E. A. Blackall.
A full study of both Part One and Part Two of Goethe's greatest masterpiece.

357 Major Works of Goethe Spring. 4 credits. Prerequisite: German 201–202 or permission of instructor. Taught in German.
W 2:30–4:30. H. Deinert.
Goetz, Tasso, Iphigenie, Werther, Wahlverwandtschaften, Novelle, selections from critical writings, poetry.

[359 *Fin de Siecle* Vienna Not offered 1984–85]

[360 Naturalism and Feminism Not offered 1984–85]

[361 Kafka and Prague Not offered 1984–85]

[362 Modern German Literature II: Twentieth-Century Prose Not offered 1984–85]

363 Contemporary Literature Spring 4 credits. Prerequisite: German 202 or permission of instructor. Taught in German.
T R 10:10–11:25. P. W. Nutting.
Drama, poetry, and prose of the seventies and eighties from both Germanys, Austria, and Switzerland. Writers to be discussed include Christa Wolf, Sarah Kirsch, Heiner Mueller, Ingeborg Bachmann, Peter Weiss, Thomas Bernhard, Peter Handke, Max Frisch, Botho Strauss, Volker Braun, and Irmgard Morgner.

[365 Lyrical Poetry Not offered 1984–85]

374 Opera Fall. 4 credits. Prerequisite: 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

283 Contemporary European Society and Politics (also History 283) Spring 4 credits.
Hours to be arranged. S. Tarrow, J. Weiss.
An introduction to European societies, their development, and current dynamics. Topic for 1984–85: *the formation of Europeans*. Education, community, and culture in Western Europe, with an emphasis upon how concepts of identity, community, class, and culture are acquired by young Europeans and developed in the worlds of family, school, work, and politics. The course is designed for students with an interest in, or experience of, various European countries, who wish to increase their knowledge of Western Europe. There are no formal prerequisites.

314 Nietzsche, the Man and the Artist Spring. 4 credits.
T R 2:30–3:45. S. L. Gilman.
An intensive reading of selections from Nietzsche's poetry, letters, and philosophical writings: *The birth of Tragedy, The Gay Science, Thus Spake Zarathustra, Beyond Good and Evil, Ecce Homo*. His work will be read in the intellectual context of his time and will be interpreted both as a reflection of his intellectual development and as a manifestation of his literary genius. In discussing the literary aspect of his work, close attention will be paid to Nietzsche's poetics.

[324 Old Icelandic Literature Not offered 1984–85]

327 Health and Disease (also Biology and Society 327 and Psychology 387) Fall. 4 credits
M 1:25–3:25. S. L. Gilman and others.
Everyone knows what health and disease are. Or do they? This Common Learning course on health and disease will explore some of the cultural, psychological, philosophical, anthropological, medical, economic, and political dimensions of these concepts to show how various models of disease function in contexts from business to engineering, from the military to the medical profession. The course will be divided into two segments: the first will examine the general implications of concepts of health and illness; the second will study these general principles as reflected in the definition, treatment, and mythmaking surrounding one specific disease: schizophrenia. The course will draw on specialists from throughout the University."

[350 Yiddish Literature in English Translation Not offered 1984–85.]

[377 Topics in Yiddish Literature Not offered 1984–85]

381 Marxist Cultural Theory (also Comparative Literature 381) Fall. 4 credits.
T R 2:30–3:45. W. Cohen, P. Hohendahl.
A historical survey of leading European Marxist thinkers, offering a critical perspective on culture, particularly in relation to ideology. Mainly a close reading of selected texts but with consideration of historical contexts as well. Some emphasis on aesthetics and especially literary theory. Readings from Marx, Engels, Lukacs, Gramsci, Brecht, Benjamin, Horkheimer, Adorno, Marcuse, Sartre, Althusser, and Williams.

399 Forms of Opposition: German Women Writers on the Nazi Period (also Comparative Literature 399 and Women's Studies 399) Spring. 4 credits.
T R 12:20–1:35. C. A. Martin.
A study of women's writing on the Nazi period, with an emphasis on the impact of divergent developments in the two postwar German states on historical memory. This course will pay particular attention to the choices and effects of different literary forms and languages. Readings will include, but not be limited to, texts by Anna Seghers, Elisabeth Langgasser, Luise Rinser, and Christa Wolf.

Graduate and Advanced Undergraduate Courses

405–406 Introduction to Medieval German Literature 405, fall; 406, spring. 4 credits each term. Prerequisites: for German 405, reading knowledge of German; for German 406, 405 or equivalent.
M W F 9:05. Fall: B. Buettner; spring: A. Groos.
405 will emphasize learning Middle High German in a literary context, using the *Nibelungenlied* and a romance of Hartmann von Aue. 406 will survey the classical period, emphasizing Wolfram von Eschenbach's *Parzival*, Gottfried von Strassburg's *Tristan und Isolde*, and major poets of the *Minnesang*, especially Walther von der Vogelweide.

[431 Goethe's Poetry Not offered 1984–85.]

[433 E. T. A. Hoffmann Not offered 1984–85]

[438 German Drama after 1945 Not offered 1984–85.]

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) Not offered 1984–85]

623 Seminar in Medieval German Literature (also Medieval Studies 601) Fall 4 credits.
W 1:25–3:25. A. Groos.
Topic: *Minnesang*.

[624 Seminar in Medieval German Literature II Not offered 1984–85.]

[625 The Northern Renaissance and Reformation Not offered 1984–85.]

627 Baroque Spring. 4 credits. Prerequisite: permission of instructor.
W 1:25–3:25. P. U. Hohendahl.
A survey.

[629 The Enlightenment Not offered 1984–85]

[631 From *Wilhelm Meister* to *Buddenbrooks* Not offered 1984–85]

[632 The Age of Goethe Not offered 1984–85]

[635 Backgrounds of German Realism Not offered 1984–85.]

636 Nineteenth-Century Poetry Fall. 4 credits.
T 2:30–4:25. E. A. Blackall.

[637 Seminar in Realism: *Die Novelle* Not offered 1984–85.]

[638 Contemporary German Women Writers Not offered 1984–85]

[**639 Modern Lyric Poetry** Not offered 1984–85.]

641 The Modern German Novel Spring. 4 credits.
R 3:35–5:35. I. Ezergailis.
Topic: Thomas Mann.

[**682 Seminar on Richard Wagner (also Music 678)** Not offered 1984–85.]

[**684 Heidegger: A Reading of *Being and Time*** Not offered 1984–85.]

699 The Hermeneutic Tradition (also Comparative Literature 699) Spring. 4 credits. Open to qualified undergraduates after consultation with instructor.
M 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.

753–754 Tutorial in German Literature Fall and spring. 1–4 credits per term. Prerequisite: permission of instructor.
Hours to be arranged. Staff.

Related Courses in Other Departments

The Novella in World Literature (Comparative Literature 314)

Survey of German History, 1890 to the Present (History 358)

The European Novel (Comparative Literature 363–364)

Poetry of the Late Eighteenth and Nineteenth Century (Comparative Literature 370)

Twentieth-Century Poetry (Comparative Literature 371)

Marx (Government 376)

Freud as an Imaginative Reader and Writer (English 409)

Pedagogy and the Nineteenth-Century Novel (Comparative Literature 418)

Greek Myth in German Postwar Literature (Society for the Humanities 420)

Seminar in European Fascism (History 457)

Difference (Comparative Literature 485)

Dostoevsky, Mann, and Gide (Comparative Literature 498)

Readings in Contemporary Social Theory (Government 661)

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.
M W F 10:10. 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.
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.
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.
Hours to be arranged. J. W. Gair and G. Kelley.

Hungarian

131 Introduction to the Hungarian Language Fall. 3 credits.
Hours to be arranged. E. W. Browne.
Introduction to the basic structure of the Hungarian language (phonology, morphology, syntax). Work with native speaker.

132 Introduction to the Hungarian Language (Continued) Spring. 3 credits.
Hours to be arranged. E. W. Browne.
Syntactic structure of Hungarian and extensive reading. Work with native speaker.

Indonesian

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Indonesian 102: Indonesian 101.
M–F 8, plus 2 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); P. D'Acierno, R. Harrison, 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 with the adviser. Italian majors are encouraged to take courses in related subjects such as history, art history, music, philosophy, anthropology, Classics, linguistics, and other modern languages and literatures. While a major often occupies only the junior and senior years, it is wise for students to seek faculty advice about the major as early as possible.

Students who elect to major in Italian ordinarily should have completed Italian 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, 12:20, or 2:30; 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 10:10 or 11:15. J. Scarpella.

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. M. G. S. Swenson.
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 1984–85]

[403 Linguistic Structure of Italian Fall. 4 credits. Prerequisite: Linguistics 102 and qualification in any Romance language. Offered alternate years. Not offered 1984–85.
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 1984–85.
Hours to be arranged. C. Rosen]

[700 Seminar in Italian Linguistics Offered according to demand. 4 credits. Not offered 1984–85.
Hours to be arranged. C. Rosen]

Literature

201 Introduction to Medieval and Renaissance Literature Fall. 3 credits. Prerequisite: reading knowledge of Italian.
M W F 12:20. R. Harrison.
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 will look at some poems of Michelangelo, one canto from Ariosto's *Orlando Furioso*, and Machiavelli's *The Prince*.

202 Introduction to Modern Italian Literature Spring. 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 1984–85]

[326 Twentieth-Century Novel Not offered 1984–85.]

[327–328 Dante: *La Divina Commedia* 327, fall; 328, spring. Not offered 1984–85.]

[335 Boccaccio (also Italian 365) Not offered 1984–85.]

344 Dante and Medieval Culture (also Comparative Literature 345) Fall. 4 credits.
T R 12:20–1:35. P. D'Acierno.
A close reading of *The Divine Comedy* with special attention to Dante's affiliations with the textual and interpretative tradition and the modes of thought in medieval culture. Course given in English; an extra meeting will be offered for students who wish to use Italian.

[345 Modern and Contemporary Short Fiction in Italy Not offered 1984–85.]

[347 Petrarch and the Renaissance Lyric Not offered 1984–85.]

354 The Aesthetic Turn: Beauty and Eros in Italian Renaissance Literature 4 credits. Fall.
T R 2:30–3:45. R. Harrison.
Michelangelo is the culmination of an aesthetic attitude that dominated the Italian Renaissance. We will follow the rise of this attitude among the Italian humanists, writers and artists of the fifteenth and sixteenth centuries, with particular attention to the Neoplatonism that pervades the cultural atmosphere of Lorenzo's Florence. We will be asking the most widely debated questions of the time: What is beauty? Is art the perfection of nature or overcoming of nature? What is the nature of erotic love? Our goal will be to arrive at Michelangelo and read his poems in relation to his artistic production, as well as the Neoplatonic theories that guided him both as poet and artist. Readings will include selected writings from various humanists, in particular Ficino, Castiglione's *Il Cortegiano*, and Michelangelo's poems. The primary readings will be supplemented by discussions of modern aesthetic theories (Hegel, Nietzsche, Heidegger).

[359–360 The Italian Renaissance Not offered 1984–85.]

[366 Seventeenth-Century Prose Not offered 1984–85.]

[370 Eighteenth-Century Thought Not offered 1984–85.]

372 Eighteenth-Century Italian Theater: From Melodrama to Tragedy Spring. 4 credits.
T R 2:30–3:45. A. Grossvogel.
The readings for this course will focus on the dramatic works of Goldoni and Alfieri, the two major Italian playwrights of the eighteenth century. Carlo Gozzi's *fiabe*, Metastasio's melodrama, Chiari's parodies, and the last sparks of the *commedia dell'arte* will also be examined to illustrate the pervasive character of the dramatic expression in the Italian literary and artistic life of the time. Attention will be given to Goldoni's role in the reform of the theater and to the bitter controversy he had to face.

[381 The Theater of Verga, D'Annunzio, Svevo, and Pirandello (also Italian 681) Spring. 4 credits Not offered 1984–85.]

[393 Narrative and Ideology in Contemporary Italian Literature (also Italian 593 and Comparative Literature 393) Fall. 4 credits. Not offered 1984–85]

394 Vico and Gramsci and the Development of Modern Italian Thought (also Italian 594 and Comparative Literature 394) Fall. 4 credits.
W 2:30–4:25. P. D'Acierno.
Close readings of Vico's *New Science* and Gramsci's *Prison Notebooks* with emphasis on the implications of these texts for contemporary literary and hermeneutic theory. An attempt will also be made to examine the relations of these two thinkers to various Italian and European intellectual traditions. Such problems as the role of theory in the human sciences, the elaboration of an interpretative theory of culture, and the methodology of the philosophy of history will be examined.

[395 Literature to Cinema (also Comparative Literature 392) Fall. 4 credits. Not offered 1984–85]

396 Cinema to Literature Spring. 4 credits.
T R 7:30–9:30 p.m. A. Grossvogel.
The course will consist of a comparative study of selected films by Fellini, Antonioni, Visconti, and others and of works by major contemporary writers such as Montale, Ungaretti, Gadda, and Calvino. These authors' similarities and contrasts in invention, style, and techniques will be explored to illustrate the evolution of contemporary aesthetics in cinematography and poetry in Italy. The films will be screened on Mondays and discussed on Wednesdays.

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 1984–85.]

429–430 Honors in Italian Literature (also Italian 628) 429, fall; 430, spring. 4 credits each term. Limited to seniors. Prerequisite: permission of instructor.
Staff.

[437 Petrarch: *Canzoniere* Not offered 1984–85.]

[485 The Nineteenth Century: *I promessi sposi* Not offered 1984–85.]

486 The Nineteenth-Century Novel Spring 4 credits.
W 2:30–4:25. A. Grossvogel.
The works that will be examined are Ugo Foscolo's *Ultime lettere di Jacopo Ortis,* Allessandro Manzoni's *I promessi sposi,* Ippolito Nievo's *Le confessioni di un italiano,* Niccolo Tommaseo's *Fede e bellezza,* Tommaso Grossi's *Marco Visconti,* and Antonio Fogazzaro's *Malombra.* These narrative works, which span from the epistolary to the historic and gothic novel, will be compared to Giacomo Leopardi's *Operette morali,* which defy conventional definitions but constitute a great contribution to modern prose.

[488 Giacomo Leopardi and Modern Italian Poetry in the Nineteenth Century Not offered 1983–84.]

[496 Futurism in Italy and Europe Spring. 4 credits. Not offered 1984–85.]

[527 Dante: *La Divina Commedia* Not offered 1984–85.]

[593 Narrative and Ideology in Contemporary Literature (also Italian 393 and Comparative Literature 393) Fall. Not offered 1984–85.]

594 Vico and Gramsci and the Development of Modern Italian Thought (also Italian 394 and Comparative Literature 394) Fall. 4 credits.
W 2:30–4:25. P. D'Acterno.
For description see Italian 394.

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. Not offered 1984–85.]

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.)
Lecs, M W 1:25; secs, T R F 9:05 or 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. 2 or 3 credits each term. Students having had Japanese 203 and 204 register for 2 credits and attend the W drill and the F lecture; other students register for 3 credits (with permission of instructor) and attend the W drill and the M, W, F lectures. Prerequisites: for Japanese 201, Japanese 203 or permission of instructor; for Japanese 202, Japanese 201 and 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, 205, or 223, 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 Reading 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.

223 Transition to Intermediate Japanese Conversation Fall. 6 credits. Prerequisite: Japanese 160 (Cornell intensive summer course) or permission of instructor.
Lecs, M W F, hours to be arranged; drills, M T W R F, hours to be arranged. Staff.
Provides transition, primarily for summer course students, into regular program. After Japanese 223 the students will have covered same material that 203 students have covered. Japanese 223 satisfies prerequisite for 204 but not for 206. Recommended also for students with insufficient background to qualify for Japanese 203, determined by examination during registration period.

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 Reading 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. Staff.
Drill in the use of spoken Japanese within the constraints set by Japanese social settings.

401–402 Advanced Japanese Reading 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.
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. Prerequisites: for Japanese 407, Japanese 304 or permission of instructor; for Japanese 408, Japanese 407 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 student needs.

541–542 Introductory Japanese for Business Purposes For graduate students only; undergraduates register for Japanese 141–142.
M–F 1:25.
For description see Japanese 141–142.

543–544 Intermediate Japanese for Business Purposes For graduate students only; undergraduates register for Japanese 241–242.
For description see Japanese 241–242.

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 each term. 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 two prerequisites: (1) completion of Linguistics 101–102, and (2) proficiency in one language other than English or qualification in two languages other than English, one of which must be non-Indo-European or non-European. 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) Three of the following:
   a) Linguistics 301
   b) Linguistics 303
   c) Linguistics 310
   d) a course in historical method, such as Linguistics 404 or 410, or the history of a specific language or family;
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 minimum of 16 additional credits chosen in consultation with the adviser from
   a) other linguistics courses
   b) courses with significant linguistic content from another discipline, for example, philosophy, anthropology, psychology;
   c) courses in a non-European or non-Indo-European language (not literature), provided that the same courses have not been used for other requirements.

Prospective majors should see Professor Harbert, 213 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 special oral examination. 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 examination on the thesis 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, p. 158.

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 11:15 or 12:20. 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. D. R. Ladd.
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. S. McConnell-Ginet.
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-Padamsee.
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.

[118 Varieties of Human Language Spring 3 credits. Not offered 1984–85.
M W F 9:05. J. E. Grimes.
Language diversity has a place in our complex world. Whether spoken by a handful of speakers or by hundreds of millions, each language manages the same tasks of communication and fits in with its social environment. Language identification, literacy, and multilingualism are among the issues touched on. Applicable toward the social science distribution requirement.]

201 Phonetics Fall. 3 credits.
M W F 11:15. D. R. Ladd.
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. Not offered 1984–85.
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 1984–85.
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. For nonmajors or majors. Not offered 1984–85.
M W F 1:25. S. McConnell-Ginet.]

264 Language, Mind, and Brain Spring. 4 credits. For nonmajors or majors. Prerequisite: a basic course in linguistics and/or psychology is desirable.
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, mental representation of linguistic knowledge, mechanisms of linguistic performance, universal grammar and the modularity hypothesis, and 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 or permission of instructor.
T R 10:10–11:25. J. S. Bowers.
301 is an introduction to phonetics and to contemporary phonological theory, with emphasis on the analysis of American English. 302 deals with advanced issues in generative phonology, including the nature of phonological rule systems, the structure of phonological representations, and principles of phonological acquisition.

303–304 Syntax I, II 303, fall; 304, spring. 4 credits each term. Prerequisite for 304: Linguistics 303 or permission of instructor.
T R 2:30–3:45. W. E. Harbert.
303 is an introduction to syntactic theory, with emphasis on the classical theory of transformational grammar. 304 is an advanced course, surveying current syntactic models and dealing with such issues as the nature of syntactic representation, levels of representation, principles of universal grammar, and the relation of syntax and semantics.

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. Not offered 1984–85.
Hours to be arranged. Staff.
Methods and procedures of dialectological study with introduction to the major dialect atlases]

310 Morphology Fall. 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.
M W F 11:15, plus one hour to be arranged.
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.
M W F 11:15, plus one hour to be arranged.
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 Fall. 4 credits. Prerequisite: Linguistics 101 or permission of instructor.
T R 1–2:15. G. M. Messing.

321 History of the Romance Languages Fall. 4 credits. Prerequisite: Linguistics 101 or equivalent, and qualification in any Romance language.
W R F 12:20. C. Rosen.
Popular Latin. Pan-Romance trends in phonology, morphology, syntax, and the lexicon. Regional divergence. Non-Latin influences. Medieval diglossia and emergence of Romance standards.

[323 Comparative Romance Linguistics Spring. 4 credits. Prerequisite: Linguistics 101 or equivalent, and qualification in any Romance language. Not offered 1984–85.
Hours to be arranged. C. Rosen.
The Romance language family in a typological perspective. Salient features of eight Romance languages; broad and localized trends in phonology, syntax, and the lexicon; and elements of dialectology.]

341 India as a Linguistic Area Fall, according to demand. 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 Spring. 4 credits. Prerequisites: some background in linguistics, philosophy, psychology, 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, Peirce, Jakobson) and to language as a semiotic system.

401 Language Typology Fall. 4 credits Prerequisite: Linguistics 101–102 or equivalent.
M W F 10:10. 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 and (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 Introduction to Applied Linguistics Spring. 4 credits. Prerequisite: a course in the structure of a language at the 400 level.
M W F 1:25. J. S. Noblitt.
Examination of the theoretical bases of applied linguistics, including second-language learning and 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.
T R 8:30–9:45. J. U. Wolff.
Social influences (ethnic, socioeconomic, educational) on linguistic behavior, shifts in register, style, dialect, or language in different speech situations.

[410 Introduction to Historical Linguistics Spring. 4 credits. Linguistics 102 or permission of instructor. Not offered 1984–85.
T R 12:20. J. Jasanoff.
A survey of the basic mechanisms of linguistic changes with examples from a variety of languages.]

[415–416 Social Functions of Language 415, fall; 416, spring. 4 credits each term. Prerequisites: Linguistics 101 or 111, or permission of instructor. Not offered 1984–85.
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. Prerequisite: Linguistics 303 or permission of instructor.
M W F 9:05. S. McConnell-Ginet.
An introduction to some central issues and techniques in recent work in linguistic semantics.

436 Language Development (also Psychology 436 and Human Development and Family Studies 436) Spring. 4 credits. Prerequisite: at least one course in cognitive psychology, cognitive development, or linguistics. S-U grades optional. Offered alternate years.
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 and spring. 4 credits. Prerequisites: Linguistics 101 or 201.
Hours to be arranged. Fall: F. E. Huffman; spring: W. Davies.
Elicitation, recording, and analysis of data from a native speaker of a non-Western 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. Not offered 1984–85.
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 1984–85.
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. Not offered 1984–85.
Hours to be arranged. J. E. Grimes.
Linguistic theory applied to relationships beyond the sentence.]

620 Area Topics in Romance Linguistics Spring. 4 credits. May be repeated for credit. Offered alternate years.
Hours to be arranged. J. S. Noblitt.
Topic for 1985: reading and linguistic analysis of the Old Provençal text, *Flamenca*.

[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. Not offered 1984–85.
Hours to be arranged. J. Jasanoff.]

623–624 Old Irish 623, fall; 624, spring. 4 credits each term. Prerequisite for 624: 623 or permission of instructor.
Hours to be arranged. J. Jasanoff.

630 Early Irish Poetry Spring. 4 credits. Prerequisite: one semester of Old Irish.
Hours to be arranged. L. Joseph.
Irish verse is remarkable for the complexity of its structure, the compression of its language, and the archaism of its subject matter. We will read legal, heroic, religious, praise, and nature poetry from the archaic, classical, and later medieval periods.

631 Comparative Indo-European Linguistics Fall. 4 credits. Prerequisite: permission of instructor.
Hours to be arranged. J. Jasanoff.
An introduction to the comparative grammar of the Indo-European languages.

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. Not offered 1984–85.
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.
Hours to be arranged. E. W. Browne.

[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. Not offered 1984–85.
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.
Hours to be arranged. 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. Not offered 1984–85.
M W F 1:25. Staff.]

[700 Seminar in Portuguese Linguistics Fall or spring, according to demand. 4 credits. Not offered 1984–85.
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. Sola.
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. Sola.
An intermediate conversation and reading course. Study of the Huarochiri manuscript.

403 Linguistic Structure of Quechua Fall. 4 credits.
Hours to be arranged. D. F. Sola.
Survey of the grammatical structure of Quechua dialects.

700 Seminar in Quechua Linguistics Fall or spring. Credit to be arranged. Prerequisite: permission of instructor.
Hours to be arranged. D. F. Sola.

Romance Linguistics and Literature

Linguistics

321 History of the Romance Languages Fall. 4 credits. Prerequisite: Linguistics 101 or equivalent, and qualification in any Romance language.
W R F 12:20. C. Rosen.
For description see Linguistics 321.

[323 Comparative Romance Linguistics Spring 4 credits. Prerequisite: Linguistics 101 or equivalent, and qualification in any Romance language. Not offered 1984–85.
Hours to be arranged. C. Rosen.
For description see Linguistics 323.]

620 Area Topics in Romance Linguistics Spring. 4 credits. May be repeated for credit. Offered alternate years.
Hours to be arranged. J. S. Noblitt.
For description see Linguistics 620.

[621 Problems and Methods in Romance Linguistics Spring 4 credits. Prerequisite: Linguistics 401 or permission of instructor. Not offered 1984–85.
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 1984–85.
Hours to be arranged. C. Rosen.
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 1984–85.]

[355 The Picaresque Novel in a European Perspective (also Comparative Literature 355) Not offered 1984–85.]

[459 Being, God, Mind: Key Terms of Western Thought from Plato to Vico (also Comparative Literature 359) Not offered 1984–85]

[460 Biology and Theology: Approaches to the Origin of Life, Evolution, Heritage and Freedom, Sexuality and Death (also Comparative Literature 460) Not offered 1984–85.]

Related Course in Another Department

The Hermaneutic 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 (director of undergraduate studies, fall, [literature] 193 Goldwin Smith Hall, 256-4047), W. Kasack, R. L. Leed (director of undergraduate studies [language], 302 Morrill Hall, 256-2322), S. Senderovich (director of undergraduate studies, spring, [literature], 194 Goldwin Smith Hall, 256-4047).

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 literature in the original language.

Study Abroad

Cornell is an affiliated institution in the program for Russian language study at Leningrad State University. Opportunities are available for study during the summer, a single semester, or the full year. Further information is available from Professor Wayles Browne.

Honors. Students taking honors in Russian undertake individual reading and research and write an honors essay.

Fees. Depending on the course, a small fee may be charged for photocopied texts for course work.

Freshman 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 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. The sequence 121–122–123 covers the same material as 101–102 at a less intensive pace. 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, F 1:25; drills, M T W R 8, 9:05, or 1:25. 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.
Lec, F 3:35; drills, M T W R 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 T R F 10:10, 11:15, or 2:30. Staff.
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 9:05 or 3:35. Staff.

305–306 Directed Individual Study 305, fall; 306, spring. 2 credits each term. Prerequisites: for Russian 305, Russian 303–304 or equivalent; for Russian 306, Russian 305.
T R 12:30. Staff.
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.
T R 10:10–11:40. L. H. Babby.
Phonological, morphological, and syntactic developments from Old Russian 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. Not offered 1984–85.
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.
T R 2:30–4. 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 through reading modern Russian prose.

407 Russian for Teachers Fall. 4 credits. Prerequisite: Russian 204 or equivalent.
Hours to be arranged. R. L. Leed.
Application of linguistics to language teaching; teaching methods; contrastive analysis of English and Russian; and practice teaching.

[601 Old Church Slavic Fall. 4 credits. This course is prerequisite to Russian 602. Offered alternate years. Not offered 1984–85.
Hours to be arranged. E. W. Browne.
Grammar and reading of basic texts.]

[602 Old Russian Spring. 4 credits. Prerequisite: Russian 601. Offered alternate years. Not offered 1984–85.
L. H. Babby.
Structural analysis of Old Russian and close reading of texts.]

633–634 Russian for Graduate Specialists 633, fall; 634, spring. 2 credits each term. Prerequisite: four years of college Russian. For graduate students only.
Hours to be arranged. S. and L. Paperno.
The course is designed for graduate students who specialize in an area of Russian studies requiring fine active control of the language. Students will have an opportunity to speak formally and informally on topics in their specialty. Fine points of syntax, usage, and style will be discussed.

[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. Not offered 1984–85.
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.
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 1984–85.]

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.
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 Fall. 4 credits. Requirements: same as for Russian 308.
M W F 1:25. A. Parthe.
Russia is a difficult culture to understand because it has been, at least until the twentieth century, two cultures: a Westernized elite and a vast, conservative Orthodox peasantry. The rift between what was "natively Russian" and what was borrowed from the West created for the educated classes a major crisis in identity. Where did Russia belong? It was a borderline culture, both East and West, and one reaction to that insecurity was to distrust or parody *both* sides of the border. Many of the greatest works of Russian culture are products of an attempt to bring these cultures together: Tolstoy and Dostoevsky in literature, Mussorgsky in music, Repin in visual art. This course begins by sampling the traditional aspects of Russian culture—folktales, early chronicles, lives of the saints, and religious art (icons and church chant). We then consider the transition to more Westernized forms, beginning in the eighteenth century, and the crises this provoked. Subsequent readings are organized around three recurrent themes: the experience of the city (Petersburg), the displaced intellectual (Russia's "superfluous men"), and the search for meaningful biography—which is linked, on a larger scale, with Russia's search for an identity in history. The basic texts are literary works of moderate length (no huge novels). Discussions are occasionally illustrated with slide shows and music. Class participation is crucial.

308 Themes from Russian Culture Spring 4 credits. No prerequisites. 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.
T R 12:20–1:35. A. Olcott.
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 in social and political history provided.

[314 Intellectual Background of Russian Literature, 1825–1930 Not offered 1984–85.]

329 Eastern Europe Today: Economics, Government, Culture (also Government 326 and Economics 329) Fall. 4 credits.
T R 2:30–3:45. G. Gibian, M. Rush, G. Staller.
Introductory, interdisciplinary survey of Poland, Hungary, Czechoslovakia, and Yugoslavia since World War II, with emphasis on contemporary developments. The goals of the course are to examine differences among East European countries as well as common elements (for example, variety of backgrounds, political relations with the USSR, domestic situations, and the economies and cultures.)

[330 The Soviet Union: Politics, Economics, and Culture (also Economics 330 and Government 330) Not offered 1984–85.]

331 Russian Poetry Fall. 4 credits. Prerequisites: Russian 202 or equivalent, and permission of the instructor. This course may be counted towards the 12 credits of Russian literature in the original language for the Russian major. Also open to graduate students.
T R 10:10–11:25. M. Senderovich.
A survey of Russian poetry with primary emphasis on analysis of individual poems by major poets.

[332 Russian Theatre and Drama Not offered 1984–85.]

[334 The Russian Short Story Not offered 1984–85.]

335 Gogol Fall. 4 credits. There may be a special section for students who read Russian; if they are Russian majors, they may count this course as one in the original language. Open to graduate students.
T R 12:20–1:35. W. Kasack.
Selected works of Gogol read closely and viewed in relation to his life and to the literature of his time. Readings in English translation.

[349 Gogol's Posterity: Satire under the Soviets Not offered 1984–85.]

[350 Tolstoy and the Disciplines (also College Scholar 350) Not offered 1984–85.]

[367 The Russian Novel Not offered 1984–85.]

[368 Soviet Literature Not offered 1984–85.]

[373 Chekhov Not offered 1984–85.]

[379 The Russian Connection (also Comparative Literature 379) Not offered 1984–85.]

[388 Politics and the Novel (also Comparative Literature 388) Not offered 1984–85.]

[389 Modern Literature in Poland, Czechoslovakia, and Yugoslavia (also Comparative Literature 389) Not offered 1984–85.]

390 The Power of Nationalism: Expressions of National Feelings in Politics, Economics, Literature, and the Arts (also Comparative Literature 390) Fall. 4 credits.
W 2:30–4:30. G. Gibian and others.
The seminar will deal with various aspects of the general subject of national feeling. In addition to studying the political phenomenon of nationalism, we will also study the roles played by national awareness in the perception of one's identity, images of national character, stereotypes of national qualities, and the relation between a sense of belonging to a nation and various other groups. Case studies of various states.

393 Honors Essay Tutorial Fall or spring 4 credits.
Hours to be arranged. Staff.

418 Pedagogy and the Nineteenth-Century Novel (also Comparative Literature 418 and Society for the Humanities 418) Spring. 4 credits.
M 2:30–4:30, plus 1 hour to be arranged.
P. Carden.
Platonic thought affiliates basic philosophical questions to pedagogy. How do we know? How do we learn? What education will produce worthy citizens and rulers? Rousseau in his *Emile* took up

the high philosophical tradition of pedagogy and recast it as a myth and as an incipient novel. In so doing he opened the way to what we can call the great pedagogical novels of the nineteenth century. In this seminar we will examine the principles of a pedagogy designed to encompass the whole of life, as it is set forth in such works of Plato as *Meno, Phaedo, Symposium,* and *Republic* and as it is reintroduced into the mainstream of philosophical thought by Rousseau's *Emile* and Schiller's *Letters on Aesthetic Education.* Then we will turn to several novels of the nineteenth century, among them Tolstoy's *War and Peace*, Dostoevsky's *Notes from Underground*, and Flaubert's *A Sentimental Education*, to see how the presumptions of a philosophical pedagogy rooted in Platonic thought were tested by authors who found in the novel a vehicle for philosophical and pedagogical myths or for their debunking.

431 Short Russian Prose Spring. 4 credits. There may be a section for students who read Russian; if they are Russian majors, they may count the course as one in the original language for the Russian major.
T R 10:10–11:25. M. Senderovich.
Short Russian prose works in English translation.

432 Pushkin Spring. 4 credits. Prerequisite: Russian 202 or equivalent, and permission of instructor. This course may be counted towards the 12 credits of Russian literature in the original language for the Russian major.
T R 2:30–3:45. S. Senderovich.
Reading in the original Russian language and discussion of selected works by Pushkin: lyrics, narrative poems, prose, plays, and *Eugene Onegin*.

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.

[493 Tolstoy's *War and Peace* and Children's Stories: Thematic Invariance and Plot Structure Not offered 1984–85.]

[494 Early Literary Semiotics, East and West Not offered 1984–85.]

[498 The Age of Symbolism Not offered 1984–85.]

[499 Russian Modernism Not offered 1984–85.]

Graduate Seminars

611 Supervised Reading and Research Fall or spring. 2–4 credits. Prerequisite: permission of the department.
Hours to be arranged. Staff.

[617–618 Russian Stylistics I and II Not offered 1984–85.]

[620 Studies in Modern Poetry Not offered 1984–85.]

[621 Russian Literature from the Beginnings to 1700 Not offered 1984–85.]

622 Eighteenth-Century Literature Spring. 4 credits. Open to advanced undergraduates. Conducted in Russian.
R 4–6. S. Senderovich.

[623 Early Nineteenth-Century Literature Not offered 1984–85.]

[624 Russian Romanticism Not offered 1984–85.]

[625 Russian Realism Not offered 1984–85.]

671 Seminar in Russian Literature Fall. 4 credits. Open to advanced undergraduates.
R 4–6. W. Kasack.
Topic: Soviet and emigré literature.

[672 Pasternak Not offered 1984–85.]

[701 Proseminar: Methods in Research and Criticism Not offered 1984–85.]

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

329 Eastern Europe Today: Economics, Government, Culture

335 Gogol

390 The Power of Nationalism

418 Pedagogy and the Nineteenth-Century Novel

431 Short Russian Prose

Courses in Russian

201–202 Readings in Russian Literature

331 Russian Poetry

432 Pushkin

491 Reading Course: Russian Literature in the Original Language

492 Supervised Reading in Russian Literature

611 Supervised Reading and Research

622 Eighteenth-Century Russian Literature

671 Graduate Seminar in 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. Not offered 1984–85.
Hours to be arranged. E. W. Browne.]

133–134 Intermediate Course 133, fall; 134, spring. 3 credits each term. Prerequisites: for Serbo-Croatian 133, Serbo-Croatian 132 or equivalent; for Serbo-Croatian 134, Serbo-Croatian 133 or equivalent.
E. W. Browne.

Sinhala (Sinhalese)

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, M. Randel, E. M. Santí (director of undergraduate studies [literature], 267 Goldwin Smith Hall, 256-4821), M. Suñer (director of undergraduate studies [language and linguistics], 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 one of the directors of undergraduate studies in Spanish, Professor Santí, for literature (267 Goldwin Smith Hall), or Professor Suñer, for language and linguistics (218 Morrill 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. 25; spring, 7:30 p.m., March 19. 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. 2, Nov. 6; spring, 7:30 p.m., Feb. 26, Apr. 9. 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. 11; spring, 7:30 p.m., March 5. 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.

Special section for medical and health professions. Spring. Permission of instructor necessary.
M W F 1:25. Staff.
Same as Spanish 203 but with emphasis on health-related themes. Intended for those students who are preparing themselves for medical and health professions.

Note: Students placed in the 200-level courses have the option of taking language and/or literature courses; see listing under Spanish 201 for description of the literary course that may be taken concurrently with the 203–204 or 211–212 language courses described below.

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. Equivalent in linguistic difficulty to Spanish 203. Completion of this course satisfies the college's language requirement. Taught in Spanish. Offered by the Department of Romance Studies.
M W F 11:15. J. Tittler.
The four basic skills of language—oral and written comprehension, writing, and speaking—are developed through explanation, drills, conversation, reading, and regularly assigned essays. These skills are taught in a humanistic context, where language is viewed as a cultural phenomenon with an integral role in literature and thought. Recommended for, but not limited to, students interested in further study of the Hispanic literatures.

212 Intermediate Spanish Spring. 3 credits. Prerequisite: Spanish 203 or 211, or permission of instructor. Equivalent in linguistic difficulty to Spanish 204.
M W F 9:05. Staff.
For description see Spanish 211.

310 Advanced Conversation and Pronunciation Spring. 2 credits. Prerequisite: Spanish 204 or equivalent.
M W F 9:05. Staff.

311 (303) Advanced Composition and Conversation Fall. 4 credits. Prerequisite: Spanish 204 or 212, or equivalent.
M W F 10:10 or 12:20. Staff.
Advanced language skills, developed through reading, grammar review, and intensive practice in speaking, writing, and translation. Analysis of present-day Spanish usage in a wide variety of oral and written texts.

312 Advanced Composition and Conversation Spring. 4 credits. Continuation of Spanish 311 but may be taken separately. Required of Spanish majors.
M W F 9:05 or 12:20. Staff.
Readings and class discussion will focus on the stylistic analysis of modern texts. Increased emphasis, through weekly essays, on students' development of an effective Spanish prose style.

[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. Not offered 1984–85.
T R 12:20–1:25. Staff.
A historical analysis of the phonology, morphology, syntax, and lexicon of the Spanish language up to the seventeenth century. Selected medieval documents are read and discussed.]

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.
M W F 11:15. M. Suñer.
Survey of the salient morphological and syntactic characteristics of contemporary Spanish.

[601 Hispanic Dialectology Fall, according to demand. 4 credits. Not offered 1984–85.
Survey of dialects of Latin America and the Caribbean.]

602 Linguistic Structure of Ibero-Romance Fall or spring, according to demand. 4 credits.
Hours to be arranged. Staff.
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 Castillian 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 linguists 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. The course is divided into small sections and is conducted mainly in Spanish. (Fulfills both the language proficiency requirement and, followed by a 300-level Spanish literature course, the humanities distribution requirement. The literature course that normally follows Spanish 201 is either 315, 316, or 317.)
Fall: M W F 9:05 or 10:10, or T R 10:10–11:25; U. DeWinter and staff. Spring: M W F 10:10 or 11:15, or T R 10:10–11:25; C. Arroyo and staff.
An intermediate reading course designed to improve reading, writing, speaking, and comprehension skills in Spanish through the reading and discussion of contemporary literary works of various genres (narrative prose, drama, poetry) from Spain and Spanish America. Emphasis is placed on the development of fluency in reading and of critical and analytical abilities. The cultural, sociological, and esthetic implications of texts by authors such as Borges, Cortazar, Fuentes, Garcia Marquez, Garcia Lorca, and Cela are considered.

[313 Spanish Civilization: Spain after Franco 4 credits. Not offered 1984–85.]

Note: Spanish 315, 316, and 317 can be taken in any order.

315 Readings in Sixteenth- and Seventeenth-Century Hispanic Literature Fall. 4 credits
M W F 11:15. C. Arroyo.
Readings and discussion of representative texts of the period from both Spain and her colonies in the New World: Garcilaso de la Vega, *Lazarillo de Tormes*, San Juan de la Cruz, Cervantes, Lope de Vega, Calderon, and others.

316 Readings in Modern Spanish Literature Fall 4 credits. Prerequisite: Spanish 201 or 4 years of high school Spanish or permission of instructor.
M W F 12:20, C. M. Arroyo, or T R 12:20–1:35, J. Kronik.
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 10:10, E. Santí, or M W F 11:15, J. Kronik.
Reading and discussion of representative texts of the nineteenth and twentieth centuries from Spanish America: Dario, Borges, Neruda, Paz, Cortazar, Garcia Marquez, and others.

323 Readings in Latin American Civilization Fall. 4 credits.
T R 10:10–11:25. E. Santí.
Readings and discussion in Spanish. The first half of the course will examine the historical development of Latin American society, its culture, and institutions; the second half will be devoted to oral presentations and in-depth discussion of topics of contemporary interest that students will have chosen and researched (for example, the political and economic crisis in Central America, Caribbean literature, Mexican muralism, etc). The final paper will be based on that presentation.

Note: The prerequisite for the following courses, unless otherwise indicated, is Spanish 315, 316 or 317, or permission of instructor.

[331 The Modern Drama in Spanish America Not offered 1983–84]

332 The Modern Drama in Spanish America Spring. 4 credits.
M W F 1:25. J. Kronik.
A study of significant plays from several Spanish American countries and Puerto Rico, with emphasis on the contemporary scene. Consideration will be given to the tensions between the expression of a Spanish American social identity and the influence of vanguard currents such as the absurd, the epic theater, and the theater of cruelty.

[333 The Spanish-American Short Story Not offered 1984–85]

[345 The Contemporary Spanish-American Novel Not offered 1984–85.]

[346 Hispanic Caribbean Culture and Literature Spring. 4 credits. Not offered 1984–85.]

351 Spanish Drama of the Golden Age Spring. 4 credits.
T R 12:20–1:35. C. Arroyo.
A reading of the canonic plays from Juan del Encina through Calderon. Lope de Rueda and the Italian origin of the Spanish *comedia;* Lope de Vega's impact on the emergence of the *comedia* as the pervasive genre in Spanish literature between 1590 and 1640. Comedy and society and the sociology within the texts Calderon: the idea of baroque Theology and play; the theological axioms as the key signifiers for understanding the structuree of the plays. The concept of baroque irony. "Spanish matter according to the rules" (*escarron*) in France.

[355 Cervantes: *Don Quijote* Fall. 4 credits. Not offered 1984–85]

[356 Spanish Lyric Poetry of the Golden Age Spring. 4 credits. Not offered 1984–85.
M. Randel.]

[375 The Picaresque Novel in a European Perspective Spring. 4 credits. Not offered 1984–85.]

[376 The Contemporary Spanish Novel Spring. 4 credits. Not offered 1984–85.
K. Vernon.]

[386 The Nineteenth-Century Spanish Novel Not offered 1984–85]

[389 The Generation of 1898 Fall 4 credits. Not offered 1984–85.]

390 Cuban Narrative: Literature and Revolution Fall. 4 credits.
T R 12:20–1:35. E. Santi.
The key stories and novels by midcentury Cuban authors will be read and discussed. Our principal theme will be the tension between formal experimentation and ideological concern. Works by Arenas, Barnet, Benitez Rojo, Cabrera Infante, Carpentier, Desnoes, Leante, and Pinera. Film versions of several works will be included.

[391 The Post-Civil War Drama in Spain Not offered 1984–85.]

[395 The Novel in Spain after the Civil War Fall. 4 credits. Not offered 1984–85.
J. Kronik.]

397 Alternative Voices in the Spanish-American Narrative Fall. 4 credits. Taught in Spanish.
M W F 1:25. J. Tittler.
A survey of works whose wisdom is somehow distinct from that of the mainstream of a given society or that represent a voice that depicts itself in some sense as not fully enfranchised. Analysis will include focusing on the sort of rhetorical devices proper to such a thematic. The overall goal, in addition to increased awareness of the issues common to underrepresented peoples, is the elaboration of a model or models for a "discourse of the margins." Specific groups considered include Indians, blacks, peons, gauchos, Chicanos, homosexuals, Puerto Ricans, and women.

[399 Spanish Film Spring 4 credits. Not offered 1984–85.]

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.

[446 The Early Spanish Love Lyric: Origins to 1700 Spring. 4 credits. Not offered 1984–85.
J. Tittler.]

469 Mystics and Moralists Fall 4 credits.
W 2:30–4:25. C. Arroyo.
Reading of Francisco de Osuna, Spanish Erasmianism, St. Teresa of Jesus, Fr. Luis de Leon, and St. John of the Cross, preceded by an anthology of medieval mysticism in which we pursue the emergence of the mystical systems and terminology. The decline of mysticism in Spain around 1600 and the emergence of a moralist literature. The impact of Justus Lipsius's new humanism, "French Learning"; J. Barclay; their presence in Quevedo and Gracian. The baroque generations; the origin of the terms *criticism* and *gusto*.

[479 Colonial Spanish-American Literature Not offered 1984–85.]

[481 Eighteenth- and Nineteenth-Century Spanish Drama Not offered 1984–85]

486 Realism and Naturalism in Spain: Clarian, Pardo Bazan, Blasco Ibanez Spring
T 2:30–4:25. U. DeWinter.
Nineteenth-century Spanish novels, criticism, and ideas will be examined in the context of European literature and thought. Among the topics to be discussed are the impact of the concept of evolution, the vision of the People, the regional and the urban novel, the "experimental" novel, and the historical novel. Writers included for discussion are Alarcon, Valera, Pereda, Clarina, Pardo Bazan, Palacio Valdes, and Galdos.

[489 Hispanic Romanticism Fall. 4 credits. Not offered 1984–85]

[497 Spanish Poetry and Poetics Fall 4 credits Not offered 1984–85]

639–640 Special Topics in Hispanic Literature 639, fall; 640, spring. 4 credits each term.

[689 Carlos Fuentes Spring. Not offered 1984–85.]

[690 Baroque and Neobaroque Spring Not offered 1984–85.]

[693 Ortega y Gasset Fall. 4 credits. Not offered 1984–85.]

695 The Self-Conscious Narrative in Spain and Spanish America Fall 4 credits.
T 2:30–4:25. J. Kronik.
A study of Hispanic prose fiction in the light of self-conscious strategies. With *Don Quijote* and *Tristram Shandy* as points of departure, the seminar will consider texts by Galdos, Unamuno, Cela, Goytisolo, Borges, Cortazar, Cabrera Infante, Garcia Marquez, and others. Current critical concerns will be brought to bear on the discussion of the texts' metafictional components. (Note: Participants are expected to have read *Don Quijote* beforehand.)

[696 The Contemporary Spanish-American Novel Not offered 1984–85]

697 Octavio Paz Spring. 4 credits.
M 2:30–4:25. E. Santí.
The evolution of Latin America's foremost poet and essayist will be traced through some of his major works. The aim of the seminar is to use Paz's works as a springboard for the discussion of broader topics: modernity, translation, surrealism, politics, psychohistory, modern poetry, and eroticism.

[699 Ortega y Gasset's *The Dehumanization of Art and Ideas of the Novel* (1925) (also Comparative Literature 690) Not offered 1984–85]

Related Course in Another Department

Early European Fiction (Comparative Literature 664) Spring.

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.
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. Not offered 1984–85.
Hours to be arranged. J. U. Wolff]

[**300 Linguistic Structure of Tagalog** Fall or spring. 4 credits. Prerequisite: Linguistics 101. Not offered 1984–85.
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.
Hours to be arranged. 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 9:05. 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.
Hours to be arranged. L. H. Babby.

Ukrainian

[**131–132 Elementary Course** 131, fall; 132, spring. 3 credits each term. Prerequisite for Ukrainian 132, Ukrainian 131 or equivalent. Not offered 1984–85.
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 9:05; 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 listings under Near Eastern Studies.

Music

J. Webster, chairman; D. R. M. Paterson, director of undergraduate studies (213 Lincoln Hall, 256-3531); 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. Zaslaw

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 this area of concentration at the 300 level or above, of which either four may be earned in Music 301 or 302 when taken once for four credits, or eight may be earned in Music 401–402.

Honors. The honors program in music is intended to provide special distinction for the department's ablest undergraduate majors. To become a candidate for honors in music, a student must be invited by the faculty at the beginning of the second semester of the junior year. As soon as possible thereafter, the student will form a committee of three 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 Challis 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 complete Javanese gamelan is on permanent loan from the Metropolitan Museum of Art, New York City; other instruments from non-Western cultures are available. 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, C. Hill; 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 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 2:30. N. Zaslaw.
An attempt to deepen understanding of, and appreciation for, opera through listening to operas, discussing them, and writing about them. Historical, dramatic, literary, and personal points of view will be considered as well as musical ones.

[114 Contemporary Music 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. Not offered 1984–85.]

[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. Not offered 1984–85.]

Introductory Courses

101 The Art of Music Fall. 3 credits.
T R 11:15; 1-hour disc to be arranged. W. Austin and staff.
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 Bela Bartok, 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 Fall. 3 credits. Not offered 1984–85.]

105–106 Introduction to Music Theory 105, fall; 106, spring. 3 credits each term. Some familiarity with music is desirable. Prerequisite for Music 106: 105 with grade of B– or better. Music 106 is limited to 50 students.
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; 1 disc to be arranged. 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 15 students. Prerequisite: permission of instructor. May not be counted for distribution in the expressive arts.
Sec 1, M W F 3:35; sec 2, M T R 3:35. Staff.
Designed primarily to prepare students 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, introduction to keyboard instruments, 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. Sumarsam, M. Hatch.
Readings, listening, and concentrated instruction in the literature, recordings, repertories, 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 discs to be arranged. 251, D. R. M. Paterson; 252, J. Feigin.
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. S. Stucky.
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.
M W F 11:15. S. Stucky.
Modal counterpoint. Study of the melodic and contrapuntal techniques characteristic of vocal music of the sixteenth century. Singing, analysis, and written exercises.

[452 Form and Analysis Spring. 4 credits. Prerequisite: Music 351 or equivalent. Not offered 1984–85.
M W F 10:10. D. R. M Paterson]

456 Orchestration Spring. 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 Fall. 3 credits. Limited to 10 students Prerequisites: Music 252 and permission of instructor.
M 1:30–4:25. M. Stith.
The basic techniques of composing music by electronic means, including *musique concrète*, tape recorder techniques such as rerecording and splicing, and the use of synthesizers. Works by noted composers and readings from current literature are studied. Students are alloted studio time to carry out class projects and assignments.

462 Orchestral Conducting Fall. 2 credits. Prerequisite: Music 352.
T 10:10–12:05. K. Husa.
The fundamentals of score reading and conducting technique; study of orchestral scores from baroque, classical, romantic, and contemporary periods. Occasionally the class will visit rehearsals of Cornell musical organizations.

[463 Choral Conducting Spring. 2 credits. Prerequisite: Music 252 or permission of instructor. Not offered 1984–85
F 2:30–4:10. T. A. Sokol]

[464 Choral Style Spring. 2 credits. Prerequisite: Music 252 or permission of instructor. Not offered 1984–85.
F 2:30–4:10. T. A. Sokol]

Music History

[218 Chopin, Chaikovski, Musorgskii Spring. 3 credits. Students may wish to register concurrently in Music 219. Not offered 1984–85.
T R 11:15; disc to be arranged. W. Austin, G. Gibian, and staff]

[219 Chopin, Chaikovski, Musorgskii Spring. 1 credit. Limited to students concurrently enrolled in Music 218. Prerequisite: reading knowledge of Russian. Not offered 1984–85.]

[221 Popular Music Spring. 3 credits. No previous formal training in music is required. Not offered 1984–85.
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 to be arranged. M. Hatch.
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 1984–85]

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.
Fall 1984: M W 1:25. N. Zaslaw.
The history of music from the rise of opera and instrumental art-music in the seventeenth century through the culmination of baroque style in the first half of the eighteenth. Emphasis on music of Monteverdi, Schütz, Purcell, J. S. Bach, and Handel.

282 Music of the Classical Period Fall or spring, every third semester. 3 credits. Prerequisite: any course in music, or permission of instructor.
Spring 1985: 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. Not offered 1984–85]

369 Debussy to the Present Fall. 4 credits Prerequisite: Music 152 or permission of instructor.
M W F 11:15. W. Austin, S. Stucky.
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 1984–85.
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 1984–85.
N. Zaslaw, S. L. Gilman]

381 Music of the Baroque Period Fall or spring, every third semester. 4 credits. Prerequisite: Music 152 or equivalent.
Fall 1984: M 1:25, W 1:25–3:20. N. Zaslaw.
The same as Music 281, but with an additional hour each week devoted to technical discussion of individual works.

382 Music of the Classical Period Fall or spring, every third semester. 4 credits. Prerequisite: Music 152 or equivalent.
Spring 1985: M 1:25, W 1:25–3:20. J. Webster.
The same as Music 282, but with one hour each week devoted to technical discussion of individual works.

[383 Music of the Romantic Era Fall or spring, every third semester. 4 credits. Prerequisite: Music 152 or equivalent. Not offered 1984–85.]

[389 The Study of Non-Western Musics 4 credits. Prerequisite: Music 152 or permission of instructor. Not offered 1984–85.
M. Hatch.]

[474 Poetry and Music in the English Renaissance (also English 426) Spring. 4 credits. Not offered 1984–85.
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 1984–85.
T R 10:10–11:25. D. Randel]

[482 Josquin des Pres to Monteverdi Spring 4 credits. Prerequisite: Music 381, 382, or 383, or permission of instructor. Not offered 1984–85.
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.

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. For every 4 credits earned in Music 321–322, 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); these 3 credits must be earned prior to, or simultaneously with, the first 2 credits in 321–322. The fee for a one-hour lesson (or two half-hour lessons) weekly, *for credit*, 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 nonrefundable 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 dollar 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, S. May.

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 and staff.

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 and staff.

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; $135 per semester will normally be awarded to such students, and a larger amount may be awarded under certain circumstances. Music 391 is not a prerequisite to 392.
Hours to be arranged. Staff.

Musical Organizations and Ensembles

Students may participate in musical organizations and ensembles throughout the year. Permission of the instructor is required, and admission is by audition only, except that the Sage Chapel Choir and the Cornell Gamelan Ensemble are open to all students without prior audition. Registration is permitted in two of these courses simultaneously, and students may register in successive years, but no student may earn more than 6 credits in these courses. Membership in these musical organizations and ensembles is also open to qualified students who wish to participate without earning credit.

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, S. May.

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.

335–336 Cornell Orchestra 335, fall; 336, spring. 1 credit. Prerequisite: permission of instructor.
Rehearsals for the Cornell Symphony Orchestra: W 7:30–10 p.m. E. Murray.

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.
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. Sumarsam, 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 and staff.
Study and performance of medieval, Renaissance, and baroque vocal and instrumental music, with recorders, crumhorns, sackbutts, viols, shawns, organ, harpsichord, and other early instruments.

[449–450 Eighteenth-Century Orchestra 1 credit. Prerequisite: permission of instructor. Not offered 1984–85.
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.

602 Analytical Technique Spring. 4 credits
W 1:30–4:25. R. Parker and staff.
A critical survey of various analytical methods in current use. Frequent analytical assignments and class presentations.

603 Editorial Practice Spring. 4 credits.
T 2:30–4:25. J. Webster, N. Zaslaw.
Fundamental techniques of source study and filiation; the nature of a musical text; the editorial process. Opportunity to make a critical edition based on original sources.

[653 Topics in Tonal Theory and Analysis Spring. 4 credits. Not offered 1984–85.
M 1:30–4:25. J. Feigin.]

654 Topics in Twentieth-Century Theory and Analysis Fall. 4 credits.
M 1:30–4:25. J. Feigin.
Schoenberg: a detailed examination of his later works, with particular attention to new developments in his serial technique. Comparison with comparable techniques in the works of living composers such as Perle and Babbitt.

657–658 Composition 657, fall; 658, spring. 4 credits each term.
W 2:30–4:25. S. Stucky.

659–660 Composition 659, fall; 660, spring 4 credits each term.
T 2:30–4:25. K. Husa.

[662 Orchestral Conducting Spring. 4 credits. Not offered 1984–85.
T 10:10–12:05. K. Husa]

669–[670] Debussy to the Present 669, fall; [670, spring]. 4 credits each term. [670: not offered 1984–85]
669: M W F 11:15; 1 disc to be arranged.
W. Austin, S. Stucky.
669: Lectures and discussion of Music 369, supplemented by analytical and bibliographical studies appropriate for graduate students.

[673 Music and Poetry in France: Late Middle Ages and Renaissance (also Music 373 and French 617) Fall. 4 credits. Not offered 1984–85.
D. M. Randel, E. P. Morris]

[677 Mozart: His Life, Works, and Times (also German 757) Fall. 4 credits. Not offered 1984–85.
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 the permission of the instructor. Not offered 1984–85.]

[681–682 Seminar in Medieval Music 681, fall; 682, spring. 4 credits each term. Not offered 1984–85.
D. Randel]

[683–684 Seminar in Renaissance Music 683, fall; 684, spring. 4 credits each term. Not offered 1984–85.
D. Randel.]

[685–686 Seminar in Baroque Music 685, fall; 686, spring. 4 credits each term. Not offered 1984–85.
N. Zaslaw.
See also Society for the Humanities 429–430]

[687–688 Seminar in Music of the Classical Period 687, fall; 688, spring. 4 credits each term. Not offered 1984–85.
J. Webster, N. Zaslaw.
See also Society for the Humanities 422.]

689–[690] Seminar in Music of the Romantic Era 689, fall; [690, spring]. 4 credits each term. [690: not offered 1984–85.]
689: R 1:30–4:25. R. Parker.
The opera of Donizetti and his contemporaries.

691–[692] Performance Practice 691, fall; [692, spring]. 4 credits each term. [692: not offered 1984–85.]
691: T 2:30–4:25. N. Zaslaw.
The origins of the orchestra.

697–698 Independent Study and Research 697, fall; 698, spring. Credit to be arranged.
Hours to be arranged. Staff.

[785–786 History of Music Theory 785, fall; 786, spring. 4 credits each term. Not offered 1984–85.
J. Webster.]

789 Liturgical Chant in the West Fall. 4 credits.
W 1:30–4:25. D. Randel.
The forms of psalmody in the Western rites.

Related Courses in Other Departments

Psychology

Psychology of Music (Psychology 418) Spring. 3 or 4 credits. Limited to 20 students. Prerequisite: major in psychology or music or permission of instructor.
C. Krumhansl, R. Shepard.
Detailed analysis of topics in the psychology of music, including theories of consonance, perception of tonal-harmonic structure, memory for music, and effects of musical training. Emphasis given to experimental methodologies.

Society for the Humanities

Italian Serious Opera during the Eighteenth Century (Society for the Humanities 422) Spring. 4 credits.
R 2:30–4:25. D. Heartz

The Interaction of Classical and Non-Classical Elements in the Tragedie-Lyrique (Society for the Humanities 429) Fall. 4 credits.
M 2:30–4:25. L. Rosow.

French Operatic Recitative from Lully to Rameau (Society for the Humanities 430) Spring. 4 credits.
M 2:30–4:25. L. Rosow.

Orpheus: The Story of a Hero (Society for the Humanities 437) Fall. 4 credits.
T 1:25–3:10. M. Fend.

Pythagorean Concept of Consonance in the Seventeenth Century (Society for the Humanities 438) Spring. 4 credits.
T 1:25–3:10. M. Fend.

Near Eastern Studies

U. DeWinter, chairman; A. Ayalon (Shiloah visiting professor), M. Amihai Collins, S. Katz (director of Program of Jewish Studies), C. Kronfeld, S. Mehrez, D. Owen (on leave fall 1984), D. Powers (director of undergraduate studies, N. Scharf

Adjunct faculty: L. Babby, M. Bernal, S. Gilman

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.

Faculty exchange with the Shiloah Center, Tel Aviv University. The Department of Near Eastern Studies has established a faculty exchange program with the Shiloah Center for Middle Eastern and African Studies at Tel Aviv University. Since spring semester 1982, the department has had a professor visiting from the center to teach a course or courses on the modern Middle East in his or her area of specialty. Courses up to this point have included a general survey on the history of the modern Middle East and seminars on Egypt, Saudi Arabia, and the Arab-Israeli conflict.

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 with 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.

Kibbutz, cosponsored by Cornell University, the University of Michigan, and Emory University. The Kibbutz is a program designed for university students in good standing. It is limited to 25 students and will be held at Ef'al Study Center of the Kibbutz Movement in Tel Aviv. Application deadline is April 15, 1985. For further details contact the Department of Near Eastern Studies.

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," pp. 218–219.

Freshman Seminars

[125 Freshman Seminar in Biblical Literature: Heroes and Heroines of the Bible Fall. 3 credits. Not offered 1984–85.]

126 Society, Economy, and Religion in Ancient Israel: King David's Jerusalem Spring 3 credits.
M W F 11:15. D. Deuel.
An investigation of daily life as it was experienced during the Davidic monarchy. We will make use of the contributions of archaeology as well as texts of the Old Testament and historical books. Topics include occupations, institutions, contemporary literature, and various other domestic and administrative features of Israelite society.

[154 Harems, Houris, and Hashish: Western Perceptions of the Middle East Spring 3 credits. Not offered 1984–85.]

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. Not offered 1984–85.]

111–112 Elementary Arabic 111, fall; 112, spring. 6 credits each term. Prerequisite for 112: 111 or permission of instructor.
M–F 2:30. Fall, D. S. Powers; spring, staff.
The fundamentals of literary Arabic are introduced through practice in reading, writing, listening, and speaking. Short selections from all periods of Arabic literature are studied.

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 12:20, plus fourth hour to be arranged.
M. Amihai Collins.
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 1984–85.]

[171–172 Elementary Yiddish 171, fall; 172, spring. 4 credits each term. Not offered 1984–85.]

[183–184 A Self-instructional Language Course for Beginners: Elementary Persian 183, fall; 184, spring. 6 credits each term. Not offered 1984–85]

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. Not offered 1984–85.]

[213 Introduction to Egyptian Arabic and to Problems of Arabic Dialectology Fall. 6 credits Not offered 1984–85]

221–222 Readings in Classical Hebrew Literature: The Art of Biblical Narrative 221, fall; 222, spring. 3 credits each term. Prerequisite for either NES 221 or 222: one year of Hebrew, modern or biblical. NES 221 is not a prerequisite for 222 as a humanities course. The sequence 221–222 may be used for language proficiency.
For description see under literature.

[238 Aramaic Spring. 3 credits. Not offered 1984–85.]

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 12:20–1:35. 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 Fall. 4 credits.
Prerequisites: NES 212 or permission of instructor.
T R 2:30–3:45. Staff.
Readings in selected literary and historical texts.

312 Advanced Arabic: Classical Historical Texts Spring. 4 credits.
T R 2:30–3:45. D. S. Powers.
Selected readings from Tabari's universal history, *Annuals of the Prophets and the Kings*. Review of grammar and syntax.

[333–334 Elementary Akkadian 333, fall; 334, spring. 4 credits each term. Not offered 1984–85]

[335 Readings in Akkadian Texts Fall. 3 credits. Not offered 1984–85.]

336 Readings in Akkadian Texts: Nuzi Dialect 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 1984–85]

Archaeology

243 The History and Archaeology of Ancient Israel to 450 B.C.E. Spring. 4 credits.
T R 12:20–1:35. D. I. Owen.
A detailed survey of the history and archaeology of the land of Canaan from the traditional origins of the Israelite tribes in the early sound millennium/middle Bronze Age (ca. 2000 B.C.E.) through the Babylonian exile to the arrival of Ezra and Nehemi (ca. 450 B.C.E.). Lectures on, and discussions of, biblical and Near Eastern literary sources relating to the history of ancient Israel, as well as an analysis of the archaeological evidence, will form the basis of the course.

[261 Ancient Seafaring (also Archaeology 275) Summer. 3 credits. Not offered 1984–85]

[262 Mediterranean Archaeology (also Classics 200) Fall. 3 credits. Not offered 1984–85]

[263 Introduction to Biblical Archaeology Summer. 3 credits. Not offered 1984–85.]

[361 Interconnections in the Eastern Mediterranean World in Antiquity Fall. 4 credits. Not offered 1984–85.]

[362 The History and Archaeology of Ebla Spring. 4 credits. Not offered 1984–85.]

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. Not offered 1984–85.]

[366 The History and Archaeology of the Ancient Near East (also Archaeology 310) Fall. 4 credits Not offered 1984–85.]

[367 The History and Archaeology of Ancient Egypt Fall. 4 credits. Not offered 1984–85.]

[461 Seminar in Syro-Palestinian Archaeology: The Israelite Conquest of Canaan Fall. 4 credits. Not offered 1984–85.]

History

151 Islamic Civilization Spring. 3 credits. May be used to satisfy the distribution requirement in history or the humanities, or the Freshman Seminar requirement.
T R 10:10–11:25. D. S. Powers.
An overview of Islamic civilization during the classical period (A.D. 600–1258), when Islam expanded both as a political structure and as a religious and intellectual community. The course will examine the social, economic, and intellectual forces that shaped the Muslim world and molded its interactions with the West. Readings of primary texts in translation.

[152 Islam in the Modern World Spring. 3 credits. Not offered 1984–85.]

241 The Holocaust: The Destruction of European Jewry, 1935–1945 Spring. 3 credits. No prerequisites.
T R 2:30–4:30. S. Katz.
A detailed examinatiaon of the main historical and ideological elements relevant to an understanding of the Nazis' "war against the Jews." Study of modern anti-Semitism, the Weimar Republic, and Hitler's seizure of power open the course. This will be followed by a close review of Hitler's anti-Jewish policy before 1939; the impact of the world war after 1939; and the successive policies of deportation, ghettoization, and mass murder. Attention will also be given to the moral and theological questions raised by these events.

[243 History of Ancient Israel to 450 B.C.E. Spring. 4 credits.
For description see NES 243 under "Near Eastern Archaeology."

[245 The Emergence of the Modern Jew, 1648–1948 Spring. 4 credits. Not offered 1984–85]

248 Introduction to Classical Jewish History Fall. 3 credits. No prerequisites.
T R 10:10–11:25. S. Katz.
A survey of the major developments in Jewish history between the destruction of the first temple in 586 B.C.E. and the rise of Islam. Topics will include the return under Ezra and Nehemiah; the encounter with Hellenism; the Antiochene persecutions; the growth of Roman influence; the rebellion of 70 C.E.; the rise of such Jewish groups as the Sadducees, Pharisees, and Essenes; the conflict with early Christianity; and the nature of rabbinic Judaism.

249 Introduction to Modern Jewish History Spring. 3 credits. No prerequisites.
T R 10:10–11:25. S. Katz.
A survey of the major developments in Jewish history between the expulsion from Spain (1492) until 1900. Topics will include the growth of mysticism and Hasidism; the development of Eastern European Jewry; the impact of emancipation; the rise of Jewish pluralism, e.g. Reform Judaism, Conservative Judaism, Neo-Orthodoxy; the character of modern anti-Semitism; the origins and growth of American Jewry; and the beginnings of political Zionism.

[252 Islamic Law and Society Spring. 3 credits. Not offered 1984–85.]

[258 Islamic History 600–1050 Spring. 3 credits. Not offered 1984–85.]

[261 Ancient Seafaring (also Archaeology 275) Not offered 1984–85.]

294 Modern History of the Middle East: Changing Politics, Society, and Ideas (also Government 358) Fall. 4 credits.
M W F 1:25. A. Ayalon.
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 1984–85.]

346 Jews of Arab Lands Spring. 3 credits
T R 12:20–1:35. D. 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.

357 Islamic Law and Society Fall. 4 credits.
T R 12:20–1:35. D. S. Powers.
The *Shari'ah*, or sacred law of Islam, embodies the totality of God's commands that regulate the life of

every Muslim in all its aspects. The *Shari'ah* comprises on an equal basis ordinances regarding worship and ritual as well as political and, in Western terms, strictly legal rules. This course examines the relationship between the *Shari'ah* and the major social, economic, and political institutions of Islamic society. Topics to be discussed will include the status of women, slaves, and non-Muslims; attitudes toward the economy and the arts; the significance of *jihad* (holy war); the nature of the Muslim city; and the relationship between the religious establishment and the government. Attention will be given to the function of the *Shari'ah* in the modern world, with special reference to the problems and challenges of legal reform.

[361 Interconnections in the Eastern Mediterranean World in Antiquity Fall. 4 credits. Not offered 1984–85.]

[362 The History and Archaeology of Ebla Not offered 1984–85.
For description see NES 362 under "Near Eastern Archaeology."]

[365 The History and Archaeology of the Divided Monarchy from the Death of Solomon to the Destruction of Jerusalem, 922-586 B.C.E. Not offered 1984–85.
For description see NES 365 under "Near Eastern Archaeology."]

[366 Archaeology of the Ancient Near East (also Archaeology 310) Fall. 4 credits. Not offered 1984–85.
For description see NES 366 under "Near Eastern Archaeology."]

[367 The History and Archaeology of Ancient Egypt Fall 4 credits. Not offered 1984–85.]

[398 Seminar in Contemporary Near Eastern Society (also Government 353) Spring. 4 credits. Not offered 1984–85.]

Literature

[204 Masterpieces of Jewish Literature I (also Comparative Literature 204) Fall. 4 credits. No prerequisites. Open to freshmen. The sequence NES 204–205 may be used to fulfill the humanities distribution requirement. Not offered 1984–85.]

[205 Masterpieces of Jewish Literature (also Comparative Literature 205) Spring. 4 credits. No prerequisites. Not offered 1984–85.]

207 Modern Hebrew Literature in Translation: The Poetry of Yehuda Amichai Fall. 3 credits Open to freshmen.
T R 2:30–3:45. C. Kronfeld.
The work of Yehuda Amichai, Israel's major poet and an international literary figure, will be studied from a historical and comparative perspective. Close readings of the poems will be placed in the context of Israeli literary and political trends. Amichai's work will be compared to that of other statehood-generation poets and analyzed on the background of influential developments in European and American modernism. Topics to be explored incude Amichai's experimentation with biblical allusion and modernist metaphor and his untraditional treatment of the traditional themes of war, peace, religion, and love. Readings are in English, but students with background in Hebrew will be supplied with bilingual texts.

208 Modern Hebrew Literature in Translation Spring. 3 credits. Open to freshmen.
T R 2:30. Staff.
This course examines the emergence and development of modern Hebrew prose fiction through its most perfected genre, the short story. A close analysis of texts will be combined with an overview of the diverse heritage that these texts manifest: biblical norms of narration, traditions of storytelling and oral narration, Western aesthetics, and, in recent times, the overwhelming influence of one writer, S. Y. Agnon. In addition to Agnon, readings will include Mendele, Peretz, Bialik, Brenner, Gnessin, Yizhar, Oz, Orpaz, and Yehoshua.

221 Readings in Classical Hebrew Literature: The Art of Biblical Narrative Fall. 3 credits. Prerequisite: NES 102 or 122 or equivalent with permission of instructor; one year of Hebrew, biblical or modern. May be used as literature to satisfy the humanities distribution requirement. Satisfactory completion of NES 221–222 fulfills the language proficiency requirement in Classical Hebrew.
M W F 11:15. M. Amihai Collins.
Intensive reading of selected narrative prose texts. Emphasis on fluency in reading and translating with special attention to Hebrew style and expression, lectures on language structures employed in storytelling, and discussions of the stories as literature. This course provides the basis for the analysis of narrative art throughout the history of Hebrew literature.

222 Readings in Classical Hebrew Literature: The Art of Biblical Poetry Spring 3 credits. Prerequisite: NES 102 or 122 or equivalent with permission of instructor; one year of Hebrew, biblical or modern. NES 221 is not a prerequisite for 222 as a humanities course.
M W F 11:15. M. Amihai Collins.
Intensive reading of selected poetry. Emphasis on fluency in reading and translating with special attention to Hebrew style and expression, lectures on language structures employed in the composition of poetry, and discussions of the poems as literature. This course provides the basis for the analysis of the art of poetry throughout the history of Hebrew literature.

225 Judaic Literature in Late Antiquity: Dead Sea Scrolls and Sectarian Literature Spring 3 credits. Open to freshmen.
W 2:30–5. M. Amihai Collins.
This course examines the challenge to Judaism's social, legal, and religious institutions posed by adherents of apocalyptic and other sectarian ideologies in antiquity. The focus is on the Dead Sea Scrolls and the Qumran community but will include literature from other communities in the Greco-Roman era (fourth century B.C.E. to second century C.E.). All readings in English translation. The focus for reflections on the relevance of apocalyptic scenarios in the modern nuclear age is provided by J. Schell, *The Fate of the Earth*, and others.

251 The Modern Arabic Novel Spring. 3 credits.
M W F 11:15. S. Mehrez.

[254 Society, Politics, and the Modern Arabic Novel Fall. 3 credits. Not offered 1984–85]

256 Modern Arabic Literature: The Short Story Fall. 3 credits.
M W F 11:15. S. Mehrez.

[291 Women in Jewish Literature: Tradition and the Literary Imagination (also Women's Studies 291) Spring. 3 credits. No prerequisites. Open to Freshmen. Not offered 1984–85.]

[303 Seminar in Modern Hebrew Literature: The Short Story Fall. 4 credits. Not offered 1984–85.]

[304 Seminar in Modern Hebrew Literature: The Novel Spring. 4 credits. Not offered 1984–85.]

[308 Agnon and Hazaz Spring. 4 credits. Not offered 1984–85]

[322 Undergraduate Seminar in Biblical Literature: Prophecy in Ancient Israel Spring. 4 credits. Not offered 1984–85]

[332 Ancient Near Eastern Literature Spring. 4 credits. Not offered 1984–85.]

[342 Biblical Interpretation in Rabbinic Literature Spring. 4 credits. Not offered 1984–85.]

[375 The Shtetl in Modern Yiddish Fiction in English Translation (also German Literature 375) Fall. 4 credits. Not offered 1984–85.]

[377 Topics in Yiddish Literature (also German Literature 377) Spring. 4 credits. Not offered 1984–85]

[402 The Poetics of Modernism in Literature and Art: Paris, New York, Tel Aviv (also Comparative Literature 402) Spring. 4 credits. Not offered 1984–85.]

[405 Metaphor, Modernism, and Cultural Context: The Use of Metaphor in Modernist Hebrew, Yiddish, English, and American Poetry (also Comparative Literature 405) Not offered 1984–85]

[457 Contemporary Arab Thought Fall. 3 credits. Not offered 1984–85.]

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.
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, be enriched by visiting lecturers, and usually require a tutorial relationship between participating faculty members and one to five students.

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) Fall or spring.

Introduction to Classical Archaeology (Classics 220 and Art History 220) Spring.

Minoan-Mycenaean Art and Archaeology (Classics 221) Fall.

Archaeology in Action (Classics 232–233)

New Testament (Classics 308) Spring

Aegean Dendrocronology (Classics 309) Fall or spring. Prerequisite: permission of instructor.

[The Archaeology of Cyprus (Classics 321) Not offered 1984–85.]

[Greeks and Their Eastern Neighbors (Classics 322) Not offered 1984–85.]

[Art and Archaeology of Archaic Greece (Classics 326) Not offered 1984–85]

Graduate Seminar in Archeology (Classics 629)

Economics, Government, and Sociology

Comparative Economics (Economics 368) Spring.

Eastern Europe Today (Government 326)

Government and Politics of the Soviet Union (Government 333)

[The Ethnic Dimensions in Politics (Government 336) Not offered 1984–85.]

[Politics of the Military (Government 349) Not offered 1984–85.]

Comparative Revolutions (Government 350)

America in the World Economy (Government 354) Spring.

[Theories of International Relations (Government 383) Not offered 1984–85.]

[Contemporary American Foreign Policy (Government 385) Not offered 1984–85.]

Sociology of War and Peace (Sociology 310)

History

[History of American Foreign Policy (History 314) Not offered 1984–85.]

Survey of German History (History 358)

[Church and State During the Middle Ages (History 367) Not offered 1984–85.]

Russian History since 1800 (History 368)

Jewish Workers in Europe and America (Industrial and Labor Relations 381)

Europe in the Twentieth Century (History 383–384)

Literature

Christianity and Judaism (Comparative Literature 326)

Old Testament Seminar (Comparative Literature 421)

Difference (Comparative Literature 485) Spring.

Management

The Environment of International Business in the Middle East (NBA 583)

Philosophy

C. A. Ginet, chairman; J. G. Bennett, R. N. Boyd, G. Fine, H. Hodes, T. H. Irwin, N. Kretzmann, R. W. Miller, S. Shoemaker, R. C. Stalnaker, N. L. Sturgeon, M. Wachsberg, A. W. Wood (director of undergraduate studies, 327 Goldwin Smith Hall, 256-5104)

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: M W F 9:05, staff; 11:15, C. Ginet; 1:25, R. Stalnaker; 2:30, staff. T R 8:40, staff; 10:10, S. Shoemaker; 12:20, staff; 2:30, R. Boyd. Spring: M W F 9:05, staff; 11:15, N. Sturgeon; 12:20, staff; 1:25, H. Hodes; 2:30, R. Miller. T R 10:10, staff; 12:20, staff; 2:30, A. Wood.

101 Introduction to Philosophy Fall or spring. 3 credits.
Fall: M W F 11:15, G. Fine. Spring: M W F 1:25, T. H. Irwin.
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 1:25. 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 1984–85.]

210 Ancient Thought Fall 4 credits
M W F 9:05. T. H. Irwin.
An introductory survey of major intellectual developments in the Greek and Roman world and their significance for later thought. The development of Greek scientific, moral, and political thinking; Greek and Hebrew thought; the growth of Christianity and its relation to Greek philosophy. Questions include: What is the nature of the universe and how can it be known? What is scientific knowledge and how does it differ from religious belief? What can man know about God? Is there any rational basis for moral beliefs and political principles? Readings (in English translation) selected from Homer, the pre-Socratic philosophers, Greek tragedy, Thucydides, Aristophanes, Plato, Aristotle, the Stoics, Epicurus, Lucretius, Marcus Aurelius, the Hebrew prophets, the Wisdom of Solomon, the Gospels, the Letters of St. Paul, Plotinus, and St. Augustine.

[211 Ancient Philosophy Not offered 1984–85.]

212 Modern Philosophy Spring. 4 credits.
T R 12:30–1:45. 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 Fall. 4 credits.
T R 10:10. A. Wood.
A study of selected writings, literary as well as philosophical, by four major thinkers to whom the term *existentialist* has often been applied: Kierkegaard, Nietzsche, Dostoyesvsky, and Sartre.

[214 Philosophical Issues in Christian Thought Not offered 1984–85.]

215 Medieval Philosophy Spring 4 credits
M W F 2:30 Staff.
An introduction to medieval philosophy, concentrating on such topics as the relationship of faith and reason, the nature of truth, the existence of God, universals in knowledge and reality, and the freedom of the will as discussed by such writers as Augustine, Boethius, Anselm, Aquinas, Scotus, and Ockham. Some attention to the historical development of philosophy from the end of antiquity through the fourteenth century.

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. N. Sturgeon.
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.
T R 2:30, R. Miller.
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 1984–85.]

[244 Philosophy and Literature Not offered 1984–85.]

245 Biomedical Ethics (also Biological Sciences 205) Fall. 3 credits. Primarily for sophomores, juniors, and seniors; permission of instructor required for graduate students.
M W F 1:25. M. Wachsberg.
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. M. Wachsberg.
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 Not offered 1984–85.]

262 Philosophy of Mind Spring. 4 credits.
M W F 10:10. R. Stalnaker.
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 Fall. 4 credits
T R 12:20. N. Kretzmann.
Recent and traditional literature will be taken into account in the examination of such topics as evidence for and against the existence of a god; philosophical problems associated with the attributes of God as described in the great monotheistic religions; and philosophical problems associated with the relationship of God to the physical universe and to man.

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 1984–85: Darwin, social Darwinism, and sociobiology.

Intermediate Courses

Some of these courses have prerequisites.

309 Plato Spring. 4 credits. Prerequisite: at least one previous course in philosophy or permission of the 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 Not offered 1984–85.]

311 Modern Rationalism Fall. 4 credits.
T R 10:10. C. Ginet.
Topic for 1984–85: Leibniz.

[312 Modern Empiricism Not offered 1984–85.]

314 Topics in Ancient Philosophy Fall. 4 credits.
M W F 1:25. T. H. Irwin.
Topic for 1984–85: Greek ethics and political theory. The origins of moral philosophy in Greek ethical thought; the conflict between morality and self-interest, and attempts to overcome the conflict; the idea of human good and its moral and political implicatiaons; the relation of reason and desire; the basis of the political community; conceptions of justice, freedom, and the role of the state. Readings from Plato, Aristotle's *Ethics* and *Politics*, Epicurus, and the Stoics. No prerequisites. No knowledge of Greek required.

[315 Special Topics in the History of Philosophy Not offered 1984–85.]

316 Kant Fall. 4 credits.
T R 10:10. A. Wood.
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 Spring. 4 credits.
T R 10:10. A. Wood.
Topic for 1984–85: the philosophy of right.

318 Twentieth-Century Philosophy Spring. 4 credits.
M W F 11:15. H. Hodes.
The writings of Frege, Russell, the early Wittgenstein, and perhaps some other turn-of-the-century figures, concerning logic, language, and knowledge, with particular attention to their work on the philosophy of mathematics.

319 Philosophy of Marx Spring. 4 credits.
M W F 1:25. R. Miller.
An investigation of Marx's theories of economics, politics, and ideology in modern societies; his materialist framework for explaining social change; and his view of postcapitalist society. Attention will be paid to the philosophy of science implicit in Marx's arguments, their implications for issues in moral philosophy, and their relevance to contemporary moral and political controversies concerning war, racism, nationalism, political repression, and social inequality. Readings will be from all periods in Marx's development, including the early writings, *Capital*, and the writings on French political history.

331 Introduction to Formal Logic Fall 4 credits
M W F 10:10. 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 Not offered 1984–85.]

341 Ethical Theory Spring. 4 credits.
M W F 10:10. M. Wachsberg.
A survey of several important ethical theories and theories about the nature and justification of ethical theories.

342 Law, Society, and Morality (also Law 666) Spring. 4 credits.
T R 12:20. 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 11:15. R. Stalnaker.
Topic for 1984–85: Skepticism.

[363 Topics in the Philosophy of Religion Not offered 1984–85.]

381 Philosophy of Science Fall. 4 credits.
M 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, and the character of scientific revolutions. In addition to the contemporary literature in the philosophy of science, readings are also drawn from the history of science and from the works of modern philosophers such as Locke, Hume, and Descartes.

[382 Philosophy and Psychology Not offered 1984–85.]

383 Philosophy of Choice and Decision Fall. 4 credits.
M W F 2:30. J. Bennett.
Philosophical foundations and applications of theories of rational decision making. Risk and uncertainty, measurement and interpersonal comparison of utilities, applications of game theory, and theory of collective choice.

[387 Philosophy of Mathematics Not offered 1984–85.]

[388 Social Theory Not offered 1984–85.]

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 Fall. 4 credits. Limited to junior and senior philosophy majors.
T 2:30–4:30. S. Shoemaker.
An examination of recent issues in metaphysics and philosophy of language (reference, necessity, essence, and realism vs. antirealism), with special attention to the view of Saul Kripke and Hilary Putnam.

412 Medieval Philosophy Fall 4 credits.
W 3:45–5:40. N. Kretzmann.
Topic for 1984–85: Aquinas's ethics.

413 Plato and Aristotle Spring. 4 credits.
M W 2:30. T. H. Irwin.
Topic for 1984–85: Aristotle's First Principles.

[414 German Philosophy after Kant Not offered 1984–85.]

[431 Deductive Logic Not offered 1984–85]

[433 Philosophy of Logic Not offered 1984–85]

[436 Intensional Logic Not offered 1984–85]

437 Problems in the Philosophy of Language Spring. 4 credits.
T R 12:20. C. Ginet.
Topic for 1984–85: Kripke on Wittgenstein.

[441 Contemporary Ethical Theory Not offered 1984–85.]

[442 Ethics and the Philosophy of Mind Not offered 1984–85.]

[443 Topics in Aesthetics Spring. 4 credits. Open to philosophy majors and philosophy graduate students; others only by permission of instructor.
T R 2:30. J. Bennett.
Topic for 1984–85: recent philosophical work (in English) in aesthetics.

[444 Contemporary Legal Theory (also Law 720) Not offered 1984–85.]

[446 Topics in Social and Political Philosophy Not offered 1984–85.]

461 Metaphysics Fall. 4 credits.
T R 12:20. H. Hodes.
An examination of reference and other relations between language and reality, with special attention to the role of the concepts of possibility, substance, and causation.

462 Theory of Knowledge Fall. 4 credits.
W 7–9:30 p.m. R. Miller.
Topic for 1984–85: realism and rationality.

[481 Problems in the Philosophy of Science Not offered 1984–85.]

490 Special Studies in Philosophy Fall or spring. 4 credits. Open only to honors students in their senior year.
Staff.

611 Ancient Philosophy Fall. 4 credits.
M 3:45–5:40. G. Fine.
Topic for 1984–85: The pre-Socratics and Plato's and Aristotle's criticisms of them.

[612 Medieval Philosphy Not offered 1984–85]

[613 Modern Philosophers Fall. 4 credits.
T 3:45–5:40. N. Sturgeon.
Topic for 1984–85 to be announced.

[619 History of Philosophy Not offered 1984–85]

[631 Logic Not offered 1984–85.]

[633 Philosophy of Language Not offered 1984–85.]

[641 Ethics and Value Theory Not offered 1984–85.]

[661 Theory of Knowledge Not offered 1984–85]

[662 Philosophy of Mind Not offered 1984–85]

664 Metaphysics Fall 4 credits
R 3:45–5:40. S. Shoemaker, M. Wachsberg.
Topic for 1984–85: Derek Parfit's *Reasons and Persons*.

665 Metaphysics Spring. 4 credits.
W 3:45–5:40. R. Stalnaker.
Topic for 1984–85: mental representation.

681 Philosophy of Science Spring. 4 credits.
M 3:45–5:40. R. Boyd.
Topic for 1984–85 to be announced.

[682 Philosophy of Social Science Not offered 1984–85.]

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

The Plural Society Revisited (Asian Studies 607–608) 607, fall; 608, spring.

Nietzsche, the Man and the Artist (German Literature 314) Spring.

Physics

D. F. Holcomb, chairman and director of undergraduate studies (109 Clark Hall, 256-7561); V. Ambegaokar, N. W. Ashcroft, K. Berkelman, 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, J. P. Sethna, S. L. Shapiro, 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 116–217–218, 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 111–122–221–222 (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 116–217–218 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 116–217–218 (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, 423, 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 112–213 or any combination of the first term of one sequence and the second term of another. It is also met by any two general education courses from the group 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; 102, spring. (101 in spring also by special permission of instructor; 101–102 normally offered in summer.) 4 credits each term. Prerequisites: three years of high school mathematics, including some trigonometry. Prerequisite for Physics 102: Physics 101 or 112 or 207. Includes more modern physics and less mathematical analysis than Physics 207–208 but more mathematics than 201–206. (Students planning to major in a physical science should elect Physics 207–208 or 112–213–214.) A mostly self-paced, mastery-oriented autotutorial format; students work in a learning center at hours of their choice. Repeated tests on each unit are given until mastery is demonstrated.

One opening lecture R Aug. 30 or F Aug. 31, fall; T Jan. 29, spring; 7:30 p.m. One two-hour disc-lab sec each week. Staff.

Basic principles treated quantitatively but without calculus. Major topics for 101: kinematics; gravitational and electric forces and fields; momentum, angular momentum, energy; thermal physics, fluid mechanics; sound waves. For 102: electricity and magnetism, optics, relativity; quantum physics, particle structure of matter. Laboratory emphasizes instrumentation, measurement, and interpretation of data. Text: *Principles of Physics*, by Frank J. Blatt.

112 Physics I: Mechanics and Heat Fall or spring (may also be offered during summer). 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisite: coregistration in Mathematics 192 (or 194 or 112), or substantial previous contact with introductory calculus, combined with coregistration in Mathematics 191 (or 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, Sept. 20, Oct. 11, Nov. 13, Dec. 4; spring, Feb. 28, Apr. 11, May 2. Fall, P. Stein; spring, D. Fitchen.

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 *University Physics*, 6th edition, by Sears, Zemansky, and Young.

116 Physics I: Mechanics and Heat Fall or spring. 4 credits. A more analytic version of Physics 112, intended for students who will be comfortable with a deeper, somewhat more abstract approach. (However, Physics 116 is not intended exclusively for prospective physics majors.) Prerequisites: a good secondary school physics course and familiarity with basic calculus. Corrective transfers between Physics 116 and Physics 112 (in either direction) are encouraged during the first few weeks of instruction.

Lecs, M W 10:10 or 12:20 (plus optional attendance at the lecture-quiz offered F 10:10 or 12:20 in Physics 112); 2 recs each week; one two-hour lab alternate weeks. Evening exams: fall, Sept. 20, Oct. 30, Nov. 27; spring, Feb. 21, Mar. 21, Apr. 16. Fall, R. Littauer; spring, staff.

A more rigorous version of Physics 112, covering similar topics at the level of *An Introduction to Mechanics*, by Kleppner and Kolenkow.

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, J. Orear.

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 devleoping 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. Not offered 1984–85.

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, galaxies, and the universe.]

[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. Not offered 1984–85.

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. 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.

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. Starting from simple questions (such as how one decides if an event—meeting someone with the same birthday, being dealt a bridge hand all in one suite—is "likely," "unlikely," or just incomprehensible), the course will attempt to reach an understanding of more subtle points: why it is, for example, that in large systems likely events can become overwhelmingly likely. From these last considerations, it may be possible to introduce the interested students in a nontrivial way to the second law of thermodynamics, that putative bridge between C.P. Snow's two cultures. Another physical theory, quantum mechanics, in which chance occurs—though in a somewhat mysterious way—may be touched on.

206 War and Peace in the Nuclear Age (also Government 384) Spring. 4 credits. Intended for nonscientists; does not serve as a prerequisite to further science courses. Assumes no scientific background but will use high school mathematics.

Lecs, M W F 2:30; 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 knowledgability 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 a two-semester introduction to physics intended 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. 11, Nov. 15; spring, Mar. 7, Apr. 11. Fall, M. Gilchriese; spring, staff.

Core-plus-branch plan. The first nine weeks of each semester are devoted to core material (lec/disc/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. Not offered 1984–85.

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 thoughful 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). 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. 4, Oct. 30, Nov. 20; spring, Feb. 26, Mar. 21, Apr. 18. Fall, J. Orear; spring, staff.

Electrostatics, behavior of matter in electric fields, magnetic fields, Faraday's law, Maxwell's equations, electromagnetic oscillations and waves, relativity. At the level of *Fundamentals of Physics*, 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). 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. 4, Nov. 6; spring, Feb. 26, Apr. 18. 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 116 and in mathematics and who desire a more analytic treatment than that of Physics 213. Prospective physics majors are encouraged to select Physics 217. Prerequisites: approval of student's adviser and permission from the instructor. A placement quiz may be given early in the semester, permitting those students who find Physics 217 too abstract or analytical to transfer into Physics 213, which they can do without difficulty at that time. Vector calculus will be taught in this course; but previous contact, especially with the operations *grad, div,* and *curl,* is helpful.

Lecs, T R S 11:15; 1 rec; 1 three-hour lab alternate weeks Evening exams may be scheduled. Staff.

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. Fall, R. Galik; spring, 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, dipoles, 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. Enrollment limited to approximately 20 students. 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, T R S 9:05, T 2:30. R. Silsbee.

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, H. Fleischmann.

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). 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. Pohl 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, staff.

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, introduction to special relativity. 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 plus lab hours to be arranged. D. Hartill.
Circuit techniques and design in electronic measurement and instrumentation, with emphasis on applications to physics experiments. At the level of *The Art of Electronics*, by Hofowitz and Hill.

510 Advanced Experimental Physics Fall or spring. 3 credits.
Labs, T W 1:25–4:25. R. Pohl 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 course coordinator of faculty member responsible for their project. Prerequisite: Physics 510.
Projects of modern topical interest that involve some independent development work by student. Opportunity for more initiative in experimental work than is possible in Physics 510.

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.
Fall: lec, T 1:25–2:40, R 2:30–4. Spring: lec, T R 10:10–11:35. S. Shapiro.
Physics 553 is a systematic introduction to Einstein's theory, with emphasis on modern coordinate-free methods of computation. Topics include review of special relativity, modern differential geometry, foundations of general relativity, laws of physics in the presence of a gravitational field, experimental tests of gravitation theories. At the level of *Gravitation*, by Misner. Physics 554 is a continuation of 553 that emphasizes applications to astrophysics and cosmology. Topics include relativistic stars, gravitational collapse and black holes, gravitational waves, cosmology.

561 Classical Electrodynamics Fall. 3 credits.
Lecs, M W F 9:05. K. Gottried.
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
Ensembles and partition functions; fluctuations, thermodynamic properties of ideal gases and crystals; Third Law; chemical equilibria. Imperfect gases; correlation functions; liquids. Ideal quantal gases; Bose-Einstein condensation. Phase transitions. Ising-models and lattice gases. At the level of McQuarrie's *Statistical Mechanics*.

572 Quantum Mechanics I Fall or spring. 4 credits.
Lecs, M W F 11:15. Fall, S. Teukolsky; spring, staff.
The formulation of quantum mechanics in terms of states and operators. Symmetries and the theory of angular momentum. Stationary and time-dependent perturbation theory. Fermi's golden rule, and variational methods. The elements of scattering theory. At a level between *Quantum Mechanics*, by Merzbacher, and *Quantum Mechanics*, by Landau and Lifshitz. Familiarity with elementary aspects of the Schroedinger equation is assumed, including its application to simple systems such as the hydrogen atom.

574 Quantum Mechanics II Spring. 4 credits. Required of all Ph.D. majors in theoretical physics.
Lecs, M W F 11:15. K. Wilson.
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.

[625 Physics of Black Holes, White Dwarfs, and Neutron Stars (also Astronomy 511, High-Energy Astrophysics) Spring. 4 credits. Not offered 1984–85.
Lecs, T R 11:15–12:40. 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. D. Fitchen.
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, mesons, and leptons. Strong, electromagnetic, and weak interactions. Relevance of symmetry laws to particle physics. Introduction to the quark model. Unification of weak and electromagnetic interactions. At the level of *Introduction to High Energy Physics*, by Perkins.

646 High-Energy Particle Physics Spring. 3 credits.
Lecs, T R 1:25–2:55. K. Berkelman.
Topics of current interest, such as high-energy electron and neutrino interactions, electron positron annihilation, and high-energy hadronic reactions, are surveyed. Lectures and reading material are at the level of *Introduction to High Energy Physics*, by Perkins.

Note: Only S-U grades will be given in courses numbered 650 or above.

651 Advanced Quantum Mechanics Fall. 3 credits.
Lecs, M W F 10:10, T 2:30. T. Kinoshita.
Relativistic quantum mechanics with emphasis on perturbation techniques. Extensive applications to quantum electrodynamics. Introduction to renormalization theory. At a level somewhat above that of *Relativistic Quantum Mechanics*, by Bjorken and Drell.

652 Quantum Field Theory Spring. 3 credits.
Lecs, M W F 11:15. T. Yan.
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 graduate 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. M. Nelkin.
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 Boltmann 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. V. Ambegaokar.
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. Prerequisites: Physics 645, 646, and 651 (652 also desirable).
Lecs, M W F 10:10. P. Lepage.
Field theoretic techniques used to study the strong and weak interactions of elementary particles are surveyed. Among these topics are path integrals, quantization of nonabelian guage theories, renormalization group equations, applications of perturbative QCD, lattice field theories, chiral lagrangians, and the Standard Model of electroweak interactions. The relevance of these techniques and theories to experimental physics will be stressed.

665 Topics in Theoretical Astrophysics (also Astronomy 555) Fall. 4 credits.
Lecs, M W F 2:30. E. Salpeter.
Usually concentrates on the theory of the interstellar medium. At the level of Spitzer's *The Physical Processes in the Interstellar Medium.*

[667 Theory of Stellar Structure and Evolution (also Astronomy 560) Fall. 4 credits. Usually offered odd-numbered years. Not offered 1984–85.
Lec, 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. Students must advise department course coordinator of faculty member responsible for their project.
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. 170.

Psychology

D. Bem, S. Bem, U. Bronfenbrenner, W. Collins, J. Cutting, R. Darlington, T. DeVoogd, H. M. Feinstein, B. L. Finlay, L. Fitzgerald, J. Freyd, E. J. Gibson, T. D. Gilovich, B. P. Halpern, R. E. Johnston, F. Keil, K. Keil, C. Krumhansl, W. W. Lambert, H. Levin, D. Levitsky, J. B. Maas, R. D. Mack, G. McQuater, D. T. Regan, E. A. Regan, T. A. Ryan, K. E. Weick
Visiting faculty: R. Shepard

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, 412, 416, 418, 436, or 492.
2) **Biopsychology:** Psychology 123, 307, 322, 324, 326, 361, 396, 422, 425. *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, 325, 327, 328, 379, 380, 381, 383, 384, 385, 402, 426, 467, 468, 469, 481, 482, 483, 485, 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, 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 301. 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, 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.

The undergraduate honors program. The honors program is designed for those exceptionally able students who wish to pursue an intensive and somewhat independent program of research in psychology. Successful participation in this program serves as evidence of the student's facility in the two most important skills of an academic psychologist: the capacity to acquire and integrate a substantial body of theoretical and factual material and the ability to engage in creative research activity. All qualified students planning on a graduate education in psychology or other academic fields should consider the honors program seriously. The program offers most students the closest contact and consultation with faculty that they will receive during their time at Cornell.

Students may enroll in the honors program either in the spring semester of their junior year or the fall semester of their senior year. The main focus of the program is the research project each student carries out in the senior year. Students must discuss their projects in the year-long senior honors seminar (Psychology 498–499), write a report of their research, and pass an oral defense of their thesis. Junior Honors (Psychology 494) serves as preparation for those activities. Students who are uncertain of the topic they wish to research or who have yet to find an appropriate faculty adviser for their project may spend the spring semester of their junior year reading about, formulating, and discussing possible research projects. A written report of the student's progress is due at the end of the semester.

Students planning on enrolling in Junior Honors must apply in the fall semester of their junior year. Applicants must have a minimum grade-point average in all psychology courses of 3.3 to be admitted to the program. Students who choose to enroll in Junior Honors gain admission to Senior Honors on the basis of satisfactory performance in the junior honors seminar. Students applying to Senior Honors without having been in Junior Honors must apply to the program by the second week of classes in the fall semester of their senior year. Such students must submit an application and letters of recommendation from two faculty members.

Final honors standing is indicated on the student's diploma. The T. A. Ryan award, accompanied by a small cash prize, is given to the student who completes the best honors project.

Distribution Requirement

The distribution requirement in the social sciences is satisfied by any two courses in psychology with the exception of Psychology 123, 307, 322, 324, 326, 350, 361, 396, 422, 425, 451, 471, 472, 473, 475, 476, 477, and 479

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 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. Not offered 1984–85.
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 1984–85.
Staff]

205 Perception Fall. 3 credits. Open to first-year students.
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 1984–85
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 1984–85.
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. Not offered 1984–85.
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, Piagetan 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. C. Krumhansl.
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 Fall. 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. B. Shannon.
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. D. Bem.
An introduction to research and theory in personality psychology, emphasizing contemporary approaches. Topics include the dynamics, structure, and assessment of personality as well as personality development and change. Biological and sociocultural influences on personality are also considered.

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.
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, equalitarian 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 the completion of a group research project and write-up. Prerequisite: an introductory psychology course.
M W F 10:10. 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.

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.
T R 10:10. J. Cutting.
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. Not offered 1984–85; next offered 1985–86.
T R 9:05. B. P. Halpern.
An examination of basic theory, data, and processes for perception of the chemosensory environment. 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, and possible consequences of chemosensory dysfunctions. At the level of *The Perception of Odors*, by T. Engen; *Food Taste Chemistry*, edited by J. C. Boudreau; and *Clinical Measurement of Taste and Smell*, edited by H. L. Meiselman and R. S. Rivlin.]

[308 Perceptual Learning Fall. 3 credits. Prerequisite: Psychology 205, 209, 305, or permission of instructor. Not offered 1984–85.]

309 Development of Perception Fall. 4 credits. Prerequisite: either Psychology 205, 209, 214, or 305, or permission of instructor.
T R 10:10–11:25. J. Freyd.
A critical examination of basic theories and empirical findings regarding perceptual development. Topics to be covered include the development of perception of objects, the spatial layout, events, pictures, and symbols. We will read, discuss, and critically analyze original experimental reports and theoretical articles. In our analysis we will ask: What is the perceptual world of the young infant and growing child like? What specific perceptual abilities does the young infant already have, and what other abilities must be developed? Are there guiding principles of perceptual development, and if so, what are they? What implications does our understanding of perceptual development have for theories of adult perception?

310 The Psychology of Reading Spring. 4 credits. Prerequisites: either Psychology 205, 214, 215, or 305, or permission of instructor.
T R 10:10–11:25. J. Freyd.
The course will introduce the major areas of psychological investigation on cognitive processes used in reading. We will read, discuss, and critically analyze original experimental reports and theoretical articles. Topics to be covered include 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. Not offered 1984–85.
M W F 9:05. Staff.
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. 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, 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?

[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 1984–85.
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. Adkins Regan, R. Johnston.
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. 4 credits. Limited to 25 juniors and seniors. Prerequisite: 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. DeVoogd.
Experiments designed to provide research experience in animal behavior (including learning) and its neural and hormonal mechanisms. A variety of techniques, species, and behavior patterns are included.

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 and humans, 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. Fieldwork placements include the school system, psychiatric institutions, halfway houses, and other mental health–oriented facilities. In addition to fieldwork, weekly supervisory/seminar meetings are held to discuss fieldwork issues and assigned readings.

328 Continuing Fieldwork in Psychopathology and the Helping Relationship Fall or spring 2 credits each term. Prerequisites: 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 research that has implications for Afro-Americans. From this perspective, the issues to be explored include (1) experimental method, (2) racial attitudes within and between groups, (3) measures of group differences, (4) cognitive abilities, and (5) motivational issues. Course requirements include student participation in discussion, an in-class presentation, a midterm paper, and a final 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, and 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.
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. The course begins with an overview of research methodology (no prior knowledge in this area is required). Readings and discussion center around the following topics: (1) the organization and representation of social information, (2) assessing the causes of social behavior, and (3) sources of error and bias in human judgment. Course requirements include an examination, an in-class presentation, a midterm paper, and a final project.

380 Beliefs and Attitudes (also Sociology 380) Spring. 4 credits. Prerequisites: 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 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 members of a society).

[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 1984–85.
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.

387 Health and Disease (also Biology and Society 327 and German Literature 327) Fall. 4 credits. Limited to 20 students.
Hours to be arranged. S. L. Gilman and faculty team.
Everyone knows what health and disease are. Or do they? This Common Learning course on health and disease will explore some of the cultural, psychological, philosophical, anthropological, medical, economic, and political dimensions of these concepts to show how various models of disease function in contexts from business to engineering, from the military to the medical profession. The course will be divided into two segments: the first will examine the general implications of concepts of health and illness; the second will study these general principles as reflected in the definition, treatment, and mythmaking surrounding one specific disease: schizophrenia. The course will draw on specialists from throughout the University.

[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. Not offered 1984–85.
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 General principles of sensory systems, and auditory, visual, and somesthetic systems are covered One aspect of each system (e.g., localization of objects in space by sound, color vision, thermoreception) will be selected for special attention. At the level of *An Introduction to the Physiology of Hearing*, by J. O. Pickles, and *Photoreceptors: Their Role in Vision*, by A. Fein and E. Z. Szuts]

[402 Current Research on Psychopathology Fall. 4 credits. Prerequisite: Psychology 325. Not offered 1984–85; next offered 1985–86.
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. Non–psychology majors with backgrounds in literature or anthropology are encouraged to apply. Not offered 1984–85.
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]

412 Human Experimental Psychology Laboratory Spring. 4 credits. Limited to 15 students. Prerequisite: knowledge of some high-level programming language, at least one 300- or 400-level course in human experimental psychology, or graduate standing in psychology, and permission of instructor.
R 2:30–4:25. Lab, to be arranged. J. Freyd, J. Cutting.
A laboratory course in current methods of experimentation in perception and cognitive psychology that will focus on the use of microcomputers in laboratory research for both stimulus presentation and data collection. Students will hand in six to seven written laboratory reports including data analysis and hard copy of computer programs. Projects will be in the areas of psychophysics, visual perception, auditory perception, pattern recognition, reading, memory, language, and concept learning.

[416 Psychology of Language Fall. 4 credits. Prerequisite: Psychology 215 or permission of instructor. Not offered 1984–85.
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]

418 Psychology of Music Spring. 3 or 4 credits, depending on whether student elects to do an independent project. Prerequisites: junior or senior standing with major in psychology or music and some background in both, or instructors' permission.
M 2:30–4:30. C. Krumhansl, R. Shepard.
Detailed analysis of topics in the psychology of music, including theories of consonance, perception of tonal-harmonic structure, memory for music, and effects of musical training. Emphasis given to experimental methodologies.

[420 Human Factors Spring. 4 credits. Prerequisites: Psychology 205 or 313, or permission of instructor. Not offered 1984–85.
M W F 11:15. Staff.
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 Fall. 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 1984–85; next offered 1985–86.
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).
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 Personality and 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. R. Mack.
A seminar and practicum course for advanced students who have mastered the fundamental concepts of personality and psychopathology. An opportunity to explore in depth issues in personality and psychopathology, particularly as they relate to issues of development, fantasy, attachment, and sex roles. Includes an experimental component involving self-disclosure, peer counseling, and group process. The goal: an integration of education and personal growth. It is recommended that students take Psychology 328, the fieldwork course, in conjunction with this seminar.

436 Language Development (also Human Development and Family Studies 436 and Linguistics 436) Spring. 4 credits. Prerequisites: at least one course in cognitive psychology, cognitive development, or linguistics. Offered alternate years.
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. Prerequisites: advanced undergraduate or graduate standing and permission of instructor. Not offered 1984–85.
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. Not offered 1984–85.
T R 2:30–4. H. Levin, L. Fitzgerald.
The research on ethnic and racial differences in intelligence will be discussed as a primary example of how social and political considerations influence research. Of particular interest is how social and political factors influence the choice of research topics, methods of investigation, and the interpretation of results. 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, weeks 1–7. 2 credits. Prerequisite: Psychology 350 or equivalent. Offered in odd-numbered years.
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. Not offered 1984–85.
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. Not offered 1984–85.
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.
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 are 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 1984–85.
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, weeks 1–7. 2 credits. Prerequisite: Psychology 471 or 350 or permission of instructor.
M W F 10:10. Staff.
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, weeks 8–14. 2 credits. Prerequisites: Psychology 472 or permission of instructor. First day of class, March 17, 1985.
M W F 10:10. R. Darlington.
Multiple regression, at the level of *Multiple Regression in Behavioral Research*, by E. Pedhazur.

475 Analysis of Nonexperimental Data Fall, weeks 1–7. 2 credits. Prerequisite: Psychology 473 or permission of instructor. Offered in even-numbered years.
T R 10:10–12:05. R. Darlington.
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. Not offered 1984–85.
T R 10:10–11:40. Staff.
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, weeks 8–14 2 credits. Prerequisite: Psychology 473 or equivalent. Offered in even-numbered years. 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, weeks 1–10. 3 credits. Prerequisite: Psychology 473 or permission of instructor. Not offered 1984–85; 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, weeks 11–14. 1 credit. Prerequisite: Psychology 350 or equivalent. Not offered 1984–85; 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 Experimental 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, cognitive dissonance, attribution processes, judgmental heuristics and biases, and research methods in social psychology.

482 Death and Dying Spring. 4 credits. Limited to 20 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 1984–85; next offered 1985–86.
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.]

485 Human Development in Post-Industrialized Societies (also Human Development and Family Studies 485) Spring. 4 credits. Limited to 20 juniors and seniors. No prerequisites.
T R 2:30–4:25. U. Bronfenbrenner and faculty team.
The course analyzes the implications for human development of the profound economic, technological, and social changes that have been taking place in modern societies. Particular emphasis is placed on the effect of these changes on the family; health, child care, and social services; the school; the workplace; and the community and the relations between these domains as they influence processes of biological and psychological development throughout the life course. The topic will be treated from the perspective of several relevant disciplines, including economics (Robert H. Frank), developmental psychology (Stephen Ceci), social anthropology (Robert J. Smith), human biology (Virginia Utermohlen), sociology (Phyllis Moen), and the law. This is one of a series of Common Learning Courses specially designed to contribute to general education at the upperclass level. Each course focuses on a topic of significance to contemporary society and has been developed by a faculty team from different disciplines, with one instructor taking primary responsibility for the integration and teaching of the course. Enrollment is limited to no more than twenty juniors and seniors from various schools and colleges at Cornell.

[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. Not offered 1984–85; next offered 1985–86.
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: upperclass majors in human development or psychology, and one course in statistics, or permission of instructor.
W F 1:25–3:20. U. Bronfenbrenner and faculty team.
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. 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) cross-cutting individual and contextual domains of person-environment interaction stages.

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.
T 2:30–4:25. D. Bem.
The specific topics of discussion vary, but the general emphasis is on a critical examination of the study of individuals in social contexts.

490 History and Systems of Psychology Fall. 4 credits. Intended for juniors, seniors, and graduate students, majors and nonmajors. Prerequisites: at least three courses in psychology or related fields or permission of instructor.
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, psychonanalysis, and cognitive psychology. Emphasis will be on the ideas that have shaped modern psychology.

492 Sensory Function (also Biological Sciences 492) Spring. 4 credits. Prerequisites: A 300-level course in biopsychology, or Biological Sciences 222 or 311, or permission of the instructors. Students are expected to have a knowledge of elementary physics, chemistry, and behavior. S-U grades optional.
M W F 10:10; sec, hours to be arranged.
H. C. Howland, B. P. Halpern.
This course covers classical topics in sensory function, such as vision, hearing, touch and balance, as well as some more modern topics like sensory coding, location of stimulus sources in space, and the development of sensory systems. Both human and nonhuman systems are discussed. In all cases the chemical, physical, and neurophysiological bases of sensory information are treated, and the processing of this information is followed into the central nervous system. At the level of *The Senses,* edited by Barlow and Mollon; *Neurons without Impulses,* edited by Roberts and Bush; and *Advances in Vertebrate Ethology,* edited by Ewert, Capranica, and Ingle.

494 Junior Honors Spring. 4 credits. Prerequisite: admission to the departmental honors program.
Staff.

498 Senior Honors Fall. 4 credits. Prerequisite: admission to the departmental honors program.
Staff.

499 Senior Honors 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.
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 1984–85.
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. Not offered 1984–85.
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. Not 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) Not offered 1984–85.]

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 Not offered 1984–85.]

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. Not offered 1984–85; next offered 1985–86.
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 1984–85.
Hours to be arranged. S. Bem.]

690 Nutrition and Behavior (also Nutritional Sciences 690) Spring. 3 credits. Prerequisites: a fundamental knowledge of psychology, physiology, and nutrition is essential. Offered alternate years.
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)

325 Introductory Psychopathology

381 Social Psychology

385 Theories of Personality

469 Psychotherapy: Its Nature and Influence

Romance Studies

The Department of Romance Studies (Nelly Furman, chairperson) 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. 171, for further information about majors and courses.

Romanian

See Modern Languages, Literatures, and Linguistics, p. 171.

Russian Literature

P. Carden, C. Emerson, G. Gibian (director of undergraduate studies, fall, 193 Goldwin Smith Hall, 256–4047), W. Kasack, W. M. Pintner (chairperson), S. Senderovich (director of undergraduate studies, spring, 194 Goldwin Smith Hall, 256-4047)

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, pp. 171–173.

Sanskrit

See Modern Languages, Literatures, and Linguistics, p. 170.

Serbo-Croatian

See Modern Languages, Literatures, and Linguistics, p. 173.

Sinhala

See Modern Languages, Literatures, and Linguistics, p. 173.

Sociology

S. Caldwell, chairman; L. Meltzer, director of undergraduate studies (316 Uris Hall, 256-4266); R. Avery, R. L. Breiger, L. Cornell, B. Edmonston, R. K. Goldsen, M. Hannan, D. P. Hayes, C. Hirschman, J. Kahl, W. W. Lambert, R. McGinnis, D. Nelkin, S. Olzak, B. C. Rosen, B. Rubin, R. Stern, J. M. Stycos, P. Tolbert, 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.

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 found opposite the elevators, third floor, Uris Hall.

The Major

The following are the requirements for a major in sociology: (1) the introductory courses, Sociology 101–201 (Rural Sociology 101 may be substituted for Sociology 101); (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 find a list of approved courses opposite the elevators, third floor, 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

100.1 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; and 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.

[100.2 Sociology, Biography, and Detective Fiction Spring. 3 credits. Not offered 1984–85.
M W 8:40–9:55. S. Caldwell.
Fiction, biography, and sociology represent distinct ways of commenting on human behavior; less familiar are the specific ways in which these approaches intersect and diverge. In addressing this issue, we will draw upon that vivid American literary phenomenon, the "hard-boiled" detective story, as produced by writers like Dashiell Hammett, Raymond Chandler, and Ross MacDonald. Sociological and biographical works on crime will be used together with the fictional accounts]

100.3 Sociology of Organizations Fall. 3 credits.
M W F 9:05. D. Fish.
This seminar will explore a ubiquitous but often misunderstood phenomenon: organizations. Increasingly our daily lives may be depicted as a series of interactions with organizations, whether they be of a religious, political, educational, or economic nature. Our exploration of classical and current theories and applications of these theories will be framed by a larger concern with the development of a sociological imagination. From Weber on bureaucracy and Michels on oligarchy to Kanter on women and the structure of organizations and Rooney's analysis of skid row rescue missions, this course will examine a variety of organizational forms and perspectives on organizations. Essays will serve to deepen student appreciation of the expanding role of organizations in modern society as well as the historical emergence of this field.

[100.4 The Family Spring. 3 credits. Not offered 1984–85.
T R 8:40–9:55.
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 Work Life and Change in America Spring 3 credits.
Hours to be arranged. K. Westby.
Work is an all-pervading phenomenon in our lives. We argue about it, we worry about it, we fight for it. What is it about occupations that dominates our lives? How has technology and world competition affected the workplace and work force in terms of our "postindustrial society"? We will look at various occupations in order to understand how and why people value their work. Do values affect work attitudes, or does the actual work affect values? In response to dehumanizing aspects of industrialization, we will also analyze alternative work styles, such as worker-owned firms. Biweekly writing assignments.

100.6 Ethnicity and Bilingualism Fall. 3 credits.
T R 10:10–11:30. E. Acevedo.
Emphasis on training students in the proper writing skills for accurate and effective usage in the social sciences. Sociological material will include culture, social change, intergroup relations, the urban experience, language, and bilingualism. Readings include second-language interference, dialects and "the language of the market place," the media and pop English, and ethnic perception of English. Biweekly assignments will be based on these topics. Extensive use of group discussions, guest speakers, voluntary oral presentations, and research techniques for written assignments.

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; Rural Sociology 101 is virtually identical to Sociology 101, and may be substituted for it. 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 or 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. Rural Sociology 101 has similar content and may be substituted for Sociology 101.

120 Introduction to Macro Organizational Behavior and Analysis (also Industrial and Labor Relations 120) Fall. 3 credits.
M W 2:30–3:45. P. Tolbert.
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.

201 Sociological Analysis (also Human Development and Family Studies 201) Fall or spring. 3 credits.
Fall: M W F 11:15, R. Breiger and staff. Spring: M W F 12:20, L. Meltzer 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 ability. 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. An introduction to the use of computers in social science research is provided.

General Education Courses

[205 Understanding the Language of Television Images (also Linguistics 205) Fall. 4 credits. Not offered 1984–85.
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).
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).
M W F 11:15. R. M. Williams, Jr.
Are human societies fundamentally cooperative or conflictful? 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. Not offered 1984–85.
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.
T R 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). Not offered 1984–85.
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) Spring. 3 credits.
T R 2:30–4. J. Brumberg.
The historical evolution of the female professions in America, including prostitution, midwivery, 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 Applications of Sociology Fall. 3 credits (4-credit option available).
M W F 1:25. S. Caldwell.
Ever more rapidly, sociology insights penetrate medicine, law, management, and other established professions and even help create wholly new professions such as polling, program evaluation, market research, and behavioral medicine. New applications of sociology sharpen old questions. Under what conditions do sociological findings become more useful than common sense, practical experience, and other sources of knowledge? When should imperfect data be used to guide action? Are sociologists unbiased? We examine real applications of sociology within a range of professions concerned with human behavior; the course is intended to be useful to students who will enter such professions. Availability of microcomputers permitting, lab exercises will provide hands-on experience with sociological investigation.

[242 Social Welfare in Europe and North America Spring. 3 credits. Prerequisite: at least one course in sociology. Not offered 1984–85.
M W F 9:05. S. Caldwell.
The achievements and problems of the modern welfare state. Drawing on historical and comparative evidence, we ask how welfare state programs (Social Security, health, housing, income maintenance, et al.) affect the long-term behavior of individuals and families 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 are the most likely directions in the future?]

243 Family Fall or summer. 3 credits (4-credit option available).
Fall: T R 10:10, plus one hour to be arranged; B. C. Rosen. Summer: hours to be arranged; D. Hayes.
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).
T R 10:10–11:30. S. Olzak.
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.

252 Public Opinion Fall. 3 credits (4-credit option available).
M W F 10:10 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.

257 Contemporary Japanese Society Spring. 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.

271 Sociology of Gender Fall. 3 credits (4-credit option available).
T R 8:40–9:55. S. Olzak.
An analysis of the structure of gender roles in America and other societies. This course will examine theories and research on sex differences and on consequences of stratification by sex. We will examine the intersection of work and household roles of men and women, including analysis of changes in recent decades. Finally, to uncover the structural sources of feminist movement, we will examine the mobilization of women in America and elsewhere.

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.
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, equalitarian 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 performing an independent research project and writing up the results. 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

301 Evaluating Statistical Evidence Spring. 4 credits.
M W F 11:15. R. L. 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.

310 Sociology of War and Peace Fall. 4 credits. Prerequisite: a course in sociology or government.
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. Not offered 1984–85.
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.]

326 Sociology of Occupations Spring. 3 credits. Prerequisite: one or more courses in sociology.
Hours to be arranged. 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. A major sociological theme is the relationship between occupational structure and workplace structure.

328 Sociology of Work Spring. 3 credits. (4-credit option available).
M W F 9:05. B. Rubin.
With the exception of those too rich, too ill, too young, or too old, most people in the United States will spend the majority of their waking lives working. Some will spend that time engaged in activity they enjoy. Others will be trapped in jobs that deaden the senses, cramp creativity, and provide only a paycheck as a reward. Nevertheless, the centrality of work in most of our lives is taken for granted; so too are the ways in which work is organized, rewards are distributed, and (though perhaps less so) workers recruited. The purpose of this course, then, is to explore, and thereby increase our understanding of, the underlying causes and consequences of the organization of work in capitalist America.

329 Organizational Cultures (also Industrial and Labor Relations 329) Fall. 3 credits. Prerequisite: permission of instructor.
M W 2:30–3:45. H. M. Trice.
This course reviews the concept of culture as it has evolved in sociology and anthropology, applying it to formal organizations in workplaces such as corporations and unions. The course first examines the nature of ideologies as sensemaking definitions of behavior, concentrating on the cultural forms that carry these cultural messages, rituals, symbols, myths, sagas, legends, and organizational stories. Considerable attention will be given to rites and ceremonials as a cultural form in organizational life that consolidates many of these expressive forms into one. The course will examine types of ceremonial behavior such as rites of passage, rites of enhancement, and rites of degradation, including the role of language-gestures, physical settings, and artifacts in ceremonial behavior. The presence of subcultures and countercultures in organizational behavior will also receive attention, especially the part played by occupational subcultures in formal organizations. Emphasis will be placed on empirical examples from both the organizational behavior literature and the professor's field research.

341 American Society Spring. 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 in Japan and China 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
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 City and Regional Planning 442) Spring. 3 credits
W 2:30–4:30. D. Nelkin.
A view of science less as an autonomous activity than as a social and political institution. We will discuss such issues as secrecy in science, ethical and value disputes, and the limits to scientific inquiry in the context of the changing relationships between science and the public.

[357 Medical Sociology Fall. 4 credits. Prerequisite: a course in the social sciences. Not offered 1984–85.
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 10:10–11:40. J. Brumberg.
This course provides an introduction to, and overview of, problems and issues in the historical literature on American families and the family life cycle. Reading and lectures demonstrate the pattern of American family experience in the past, focusing on class, ethnicity, sex, and region as important variables. Analysis of the private world of the family deals with changing cultural conceptions of sexuality, sex roles, generational relationships, stages of life, and life events. Students are required to do a major research paper on the history of their family, covering at least two generations and demonstrating their ability to integrate life-course development theory, data drawn from the social sciences, and historical circumstances.

[364 Race and Ethnicity Fall. 4 credits. Not offered 1984–85.
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.]

373 Organizational Behavior Simulations (also Industrial and Labor Relations 373) Fall, weeks 1–7. 2 credits. Prerequisites: Industrial and Labor Relations 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.

375 Economic Sociology Fall. 4 credits.
T R 2:30–4. M. Hannan.
Considers a variety of topics at the border of sociology and economics, with special attention to the sociological constraints on economic organization and the impacts of economic organization on social change. Topics covered include marriage market, careers, the structure of firms and industries, world system processes, social movements, and revolution.

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 1984–85.
T R 1:15–2:30.
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. 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 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 1984–85.
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, stereotypy, ideology, sociolcultural 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 the 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. Not offered 1984–85.
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.]

404 Human Fertility in Developing Nations (also Biology and Society 404) Spring. 4 credits. Prerequisite: Sociology 230 or permission of instructor.
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.

[414 Population Policy (also Biology and Society 414) Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. Not offered 1984–85.
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.]

416 Business, Labor, and the State Fall. 4 credits.
M W F 10:10. 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 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 1984–85.
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 Sociology 420 or equivalent.
M W 2:30–4:30; lab, F 2:30–4:30. Staff.
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 Longitudinal and Categorical Data: Design and Analysis Fall. 4 credits. Prerequisite: Sociology 424 or equivalent.
M W F 11:15. S. Caldwell.
Design, analysis, and interpretation techniques for (1) multivariate models of categorical (discrete) responses, and (2) multivariate models based on longitudinal data. The course emphasizes the seamless relationship of theory, design, measurement, analysis, and interpretation. Specific topics include discrete-time categorical response models (log-linear, logit, and probit); random assignment and survey designs; time series; pooling; sample selection bias; real and spurious state dependence; measurement error, both random and systematic; confirmatory and exploratory styles. More attention to applications than proofs. Lab exercises on microcomputers provide hands-on experience for most topics.

426 Policy Research (also Rural Sociology 426 and Consumer Economics and Housing 426) Spring. 3 credits (4-credit option available). Prerequisite: a course in multivariate statistics.
Hours to be arranged. S. Caldwell.
Exemplars of social research explicitly aimed at guiding policy/action. Intended especially for those students considering nonacademic careers. Case studies will illustrate the distinctive qualities of applied research, as well as identify many of the specific actors involved in its sponsorship, production, and use. We consider not only the methodological requirements and substantive flavor but also the politics of applied research. Microcomputer-based lab exercises provide hands-on experience.

[427 The Professions: Organization and Control (also Industrial and Labor Relations 427) Fall. 4 credits. Not offered 1984–85.
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. J. Stycos.
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.
M W F 9:05. R. Avery.
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.

[439 Social and Demographic Changes in Southeast Asia Fall. 4 credits. Not offered 1984–85.
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.]

442 Family and Population in History Fall. 4 credits.
R 2:30–5. 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.

444 Contemporary Research in Social Stratification Fall. 4 credits.
T 2:30–5. R. L. Breiger.
Stratification and mobility as paired concepts requiring mutual articulation. The interplay of structure (occupational groups, labor markets, organizational demographics, social classes) and process (tracking, career trajectories, socioeconomic attainment).

[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. Not offered 1984–85.
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.]

[462 Society and Consciousness Spring. 4 credits. Limited to 15 students. Prerequisite: permission of instructor. Not offered 1984–85.
Hours to be arranged. R. Goldsen.
An examination of the role of communications systems in the formation of human consciousness.]

468 Women and Achievement Fall. 4 credits.
T 2:30–4:30. B. C. Rosen.
An analysis of social and psychological factors affecting female achievement. Topics will include women in the labor force, sex differences in children's achievement, the impact of sex roles on the socialization of competence and achivement among women, and the impact of marriage and the family on career choice and occupational achievement.

481 Experimental 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, cognitive determinants of the emotions, cognitive dissonance, attribution processes, judgmental heuristics and biases, 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 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 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. Not offered 1984–85.
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 Independent Study Fall or spring 1–4 credits.
After consulting their major adviser, students should apply to the director of undergraduate studies for permission to take indpendent 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.

495 Honors Research Fall or spring. 4 credits. Limited to sociology majors in their senior year. Prerequisite: permission of instructor.
Hours to be arranged. M. Hannan and staff.

496 Honors Thesis: Senior Year Fall or spring. 4 credits. Prerequisite: Sociology 495.
Hours to be arranged. M. Hannan and staff.

497 Social Relations Seminar (also Anthropology 495) Spring. 4 credits. Limited to seniors majoring in social relations.
W. W. Lambert.

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 in advance of each semester. The list below indicates seminars that are likely to be offered 1984–85, but others may be added, and some may be deleted. Students should check with the department before each term.

515 The Politics of Technical Decisions I (also City and Regional Planning 541, Management NBA 686, and Government 628) Fall. 4 credits.
W 2:30–4:30. D. Nelkin.
Political aspects of decision making in technical areas. Drawing from recent risk disputes, we will examine the origins and characteristics of "technical politics," the role of experts in government, and the problem of expertise in a democratic system.

516 The Politics of Technical Decisions II (also City and Regional Planning 542, Management NBA 687, and Government 629) Spring. 4 credits.
Prerequisite: The Politics of Technical Decisions I.
Hours to be arranged. D. Nelkin.
Continuation of the Politics of Technical Decisions I. Political aspects of decision making in technical areas. Drawing from recent risk disputes, we will examine the origins and characteristics of "technical politics," the role of experts in government, and the problem of expertise in a democratic system.

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 1984–85.
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.]

[541 Sociological Theory Fall. 4 credits. Prerequisite: graduate standing or permission of instructor. Not offered 1984–85.
M W 1:25–3:20. R. M. Williams, Jr.
Comtemporary 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).]

555 Social Structure and Social Change Spring. 4 credits.
T R 2:30–4. M. Hannan.
Considers application of sociological theory and methods to the study of core problems of social structure and social change. Involves intensive analysis of recent monographs and research reports on a variety of topics.

[585 Social Structure and Personality (also Psychology 585) Fall. 4 credits. Not offered 1984–85.
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.]

591 Special Seminars in Sociology Fall and spring. 2–4 credits.
Hours to be arranged. Staff.
These graduate seminars will be offered irregularly. Topics, credit, and instructors will vary from semester to semester. Sections scheduled for fall 1984 are listed below, but students should also look at the Sociology Department bulletin board at the beginning of each semester for possible additional offerings. Section 1: Assessing social effects of new communication systems, 4 credits, M 2:30–5:30, R. Goldsen; section 2: Stochastic mobility modeling, 3 credits, hours to be arranged, R. McGinnis and R. L. Breiger; section 3: Comparative racial and ethnic relations, 4 credits, R 2:30–5. S. Olzak.

[601 Southeast Asia Seminar: Malaysia (also Asian Studies 601) Fall. 4 credits. Not offered 1984–85
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.
T R 10:10–1. F. Buttel, P. Eberts
This seminar is the same as Sociology 401 plus a third hour for graduate students only. Graduate students enroll in 603 rather than 401.

620 Theories of Organizational Change, Innovation, and Evaluation (also Industrial and Labor Relations 620) Spring. 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.

622 Organizations and Environments (also Industrial and Labor Relations 622) Spring. 4 credits.
Hours to be arranged. P. Tolbert.
This course will survey the literature on organization-environment relations, including work on organizational dependence and power, management of uncertainty, and other aspects of interorganizational cooperation and conflict. The objective of the course is to provide students with a general theoretical understanding of the way in which organizations can shape their environment and in which the environment constrains and shapes organizations.

[624 Advanced Methods of Epidemiology (also Veterinary Medicine 665) Fall. 4 credits. Not offered 1984–85; next offered 1985–86.
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 option; 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.]

[646 Seminar: Social Stratification Fall or spring. Not offered 1984–85.
R 2:30–4:30]

[670 Community, Housing, and Local Political Processes (also Consumer Economics and Housing 670) Spring. 3 credits. S-U grades optional. Not offered 1984–85.
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 1984–85.
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]

676 Systems of Labor Participation in Management (also Industrial and Labor Relations 676) Fall. 4 credits. Limited to 25 students. Prerequisite: senior standing and permission of instructor.
T R 10:10–11:25. 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 (also Industrial and Labor Relations 677) Fall. 3 credits. Enrollment limited. Prerequisite: permission of instructor.
M W 2:30–3:45. 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) Fall. 4 credits.
M 2:30–5. D. Hayes.
Topic for 1984–85: microsociology—including topics such as face-to-face interaction, small groups, roles, and socialization—and the relevance of microsociology to macrosociological processes.

[685 Sex Differences and Sex Roles (also Psychology 685 and Women's Studies 685) Fall 4 credits. Not offered 1984–85.
Hours to be arranged. S. Bem.]

724 Behavioral Research Theory, Strategy, and Methods II (also Industrial and Labor Relations 724) Spring. Variable credit. Prerequisite: permission of instructor. Must be taken in sequence with Industrial and Labor Relations 723, except by petition. Designed to meet the needs of M.S. and Ph.D. degree candidates majoring in organizational behavior, but other graduate students may enroll.
Hours to be arranged. P. Tolbert.
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 (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.

727 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.

[771 Research Seminar in Population (also Rural Sociology 771) Spring 4 credits. Not offered 1984–85; next offered 1985–86.
T 2:30–5:30. B. Edmonston]

891–892 Directed Research 891, fall; 892, spring
Up to 4 credits each term, to be arranged.
Prerequisite: graduate status and permission of a faculty member willing to supervise the project.

895–896 Thesis Research 895, fall; 896, spring.
Up to 6 credits each term, to be arranged
Prerequisite: permission of thesis director.

Swahili

See Africana Studies and Research Center, p. 207.

Tagalog

See Modern Languages, Literatures, and Linguistics, pp. 175–176.

Tamil

See Modern Languages, Literatures, and Linguistics, p. 176.

Telugu

See Modern Languages, Literatures, and Linguistics, p. 176.

Thai

See Modern Languages, Literatures, and Linguistics, p. 176.

Theatre Arts

Drama, Dance, Film

P. Lawler, chairman; R. Archer, V. A. Becker, H. Cole (dance coordinator, Helen Newman Hall), S. R. Cole, P. J. Curtis, R. Dressler, D. Fredericksen, R. Gross, M. Hays, J. Morgenroth, E. Newman, S. Perkins, M. Rivchin, P. Saul, J. Thorp, A. Van Dyke

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.

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 1987, 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 classes of 1986 and 1987.

Requirements for the classes of 1986 and 1987:

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.

Requirements for the class of 1988 and beyond:

1) Theatre Arts 200, 230, 250, and 280.
2) Same as classes of 1986 and 1987.
3) Same as classes of 1986 and 1987.
4) Three courses (at least 9 credits) in other departmental courses, chosen in consultation with the student's faculty adviser.
5) Same as classes of 1986 and 1987.
6) Same as classes of 1986 and 1987.

Film Concentration

Requirements:

1) Theatre Arts 230 or 240, 250 and 280.
2) Theatre Arts 374 with a grade of C+ or better.
3) 16 credits in film that should include:
   a) two courses chosen from Theatre Arts 375, 376, 378, and 379;
   b) Theatre Arts 377;
   c) 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 the last day of classes in the final semester of the senior year and an examination to be held not later than the week after the thesis or practicum has been submitted.

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, 130, 140, or 150.

Freshman Seminars

[108 Writing about Film (also English 108) Fall or spring. 3 credits. Not offered in Theatre Arts 1984–85.
T R 12:20–1:35.
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. No familiarity with film history or analysis is expected.]

130 American Myth in Drama Fall or spring. 3 credits.
M W F 1:25. R. Jones.
This course examines the images of America presented on the twentieth-century stage. How do Americans view themselves? How are they seen by foreign dramatists? To what ends do dramatists use the American myth?

140 From Script to Stage: Writing about the Theatrical Process Fall or spring. 3 credits.
Sec 1, M W F 9:05, D. Graver; sec 2, M W F 10:10, M. Link.
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.

150 Looking at Dance Fall. 3 credits.
T R 1:25–2:40. J. Morgenroth.
This course will explore various aspects of dance writing, including descriptive prose, essays, and reviews. The work of some twentieth-century critics and philosophers will be read for information and perspective and as models of style. Viewing of photographs, films, videotapes, and live performance will complement the readings.

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 first Tuesday of classes.
Staff.
Instruction and practice at the introductory level of the basic techniques of construction and operation of scenery, costumes, lighting, and sound.

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 first Tuesday of classes.
Staff.
Practical production experience and specific responsibility—on all levels—in stage management of department productions. Theatre Arts 370 complements this course. Guided and supervised by appropriate faculty on individual productions.

155 Rehearsal and Performance Fall or spring. 1–2 credits; 1 credit per production experience per term up to 2 credits per term. Students must register for the course in the term in which credit is earned; requests for retroactive credit will not be honored. Limited to students who are assigned roles after tryouts at the department's scheduled auditions. Students should add this course only after they have been assigned roles. S-U grades only.
Staff.
The study, development, and performance of roles in departmental theatre or dance productions.

200 Introduction to Dance I Fall. 3 credits. Limited to 12 students. Concurrent enrollment in a dance technique class at the appropriate level is required. Registration only through department roster in 302 Helen Newman Hall.
T R 5–6. P. Saul.
An introduction to Western theatrical dancing through history, theory, and practice. Films, videotapes, and some readings are discussed. Some class time is given to experiments in movement improvisation and composition. Concurrent enrollment in a dance technique class at the appropriate level is required.

201 Introduction to Dance II Spring. 3 credits. Limited to 12 students. Prerequisite: Theatre Arts 200 or permission of instructor. Registration only through department roster in 302 Helen Newman Hall.
T R 4:45–6:15. 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. P. Lawler, 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 Spring. 4 credits. Prerequisite: Theatre Arts 200, 201, and 210.
M W 6:30–8 p.m. P. Lawler, D. Borden.
Continuation of Theatre Arts 210.

230 Introduction to Theatre History Fall. 3 credits.
M W F 9:05. Staff.
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.

237 Opera (also Music 274) Fall. 3 credits.
M W F 12:20. A. Groos, R. Parker.
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 courses, optional trips to live performances will be scheduled where possible.

240 Introduction to the Theatre Spring or summer. 3 credits.
M W F 11:15. Spring: 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.

250 Fundamentals of Theatre Design/Technology Fall or spring. 4 credits. Not open to first-term freshmen. Limited to 20 students.
Lec-lab, M W F 2:30–4:25. Staff.
An introduction to design and technical process in the theatre, with particular attention to the unique collaboration of playwright, 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 first Tuesday of classes.
Staff.
Specialized instruction and specific responsibilities in production positions such as light-board operator, wardrobe mistress, and set or properties-crew head, often preceded by work in specific areas of scenery, costumes, and lighting, to develop technical skill required by such positions.

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, staff; sec 3, T R 12:20–2:15, staff; sec 4, T R 12:20–2:15, staff; sec 5, T R 12:20–2:15, staff; sec 6, T R 12:20–2:15, staff; 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 (offered spring only), hours to be arranged, staff; sec 2, M W 10:10–12:05, T. Cronin.
Practical exploration of the actor's craft through improvisation and 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 12:20–2:15. E. Newman.
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 12:20–2:15. E. Newman.
Development of vocal technique with additional emphasis on articulation and basics of standard American pronunciation.

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 working on scholarly projects. 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.

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 3:05–4:35. 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 4:50–6:20. L. Wilkinson.
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.
[Section 1: Indian Dance. Not offered 1984–85. Section 2: Japanese Noh Theatre. Not offered 1984–85.] Section 3: Indonesian Dance Theatre. Section 4: Topic to be announced.
Readings, lectures, and practice sessions. On Fridays there will be lectures, demonstrations, and discussions. Videotapes and films will be shown. The Monday and Wednesday classes will consist of learning basic movement vocabulary and dances. No previous experience in dance is necessary.

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 4:50–6:20. J. Morgenroth.
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. Not offered 1984–85.
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 Francone, will be supplemented by laboratory work in movement analysis.]

[314 History of Dance I Fall. 3 credits. Not offered 1984–85.
T R 3:05–4:35.
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. Not offered 1984–85.
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 1984–85.
M W F 9–10:30. P. 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.]

[325 Classic and Renaissance Drama (also Comparative Literature 352) Fall. 4 credits. Not offered 1984–85; next offered 1985–86.
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]

326 European Drama, 1660 to 1900 (also Comparative Literature 353) Spring. 4 credits.
T R 10:10–11:35. Staff.
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.
T R 2:30–3:45. M. Hays.
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. Not offered 1984–85; next offered 1985–86
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.
M W F 10:10. 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 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.
T R 10:10–11:25. 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, Schroder, 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. Not offered 1984–85; next offered 1985–86.
M W F 10:10–11. Staff.
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.
T R 2:30–3:45. Staff.
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, Leoplod 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. Not offered 1984–85; next offered 1985–86.
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.]

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.
T R 2:30–3:45, R 2:30–5. R. Gross.
A continuation of Theatre Arts 348, culminating in the composition of a full-length play.

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 first Tuesday of classes.
Production experience in advanced positions in design and/or technology. These include full responsibility for a smaller production assignment, major responsibilities as an assistant on a major production, or significant responsibilities as major crew head.

354 Stagecraft: Scenery and Lighting Spring. 3 credits. Prerequisite: Theatre Arts 250 or permission of instructor.
M W 10:10–12:05. V. Becker.
Lectures, discussion, and projects on theatre architecture and equipment; scenic construction, mechanics, and painting; lighting techniques and practice. Students are encouraged to complement this course with 1 or 2 credits of appropriate production lab.

356 Stagecraft: Costumes Fall. 3 credits. Prerequisite: Theatre Arts 250 or permission of instructor.
M W 10:10–12:05. S. Perkins.
Lectures, discussion, and projects in costume cutting and construction, fabric dyeing and painting, tailoring techniques, fitting, wigs, and makeup. Students are encouraged to complement this course with 1 or 2 credits of appropriate production lab.

362 Lighting Design and Technology Fall. 4 credits. 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 the influence of professional practices on lighting design.

364 Scene Design and Technology Spring. 4 credits. Prerequisite: Theatre Arts 250 or permission of instructor.
M W 12:20–2:15. Scene design faculty.
A study of the basic problems of design and technology of scenery for the theatre. 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 Fall. 4 credits. 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 technical analysis of the play and characters, the use of period research as a source of style and construction techniques, and the application of materials, tools, and techniques to the design process that gives characters 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.

372 English Drama (also English 372) Spring 4 credits.
M W F 10:10. B. Adams.
Major events in the English theatre from the Middle Ages to the beginning of the twentieth century. Plays by Marlowe, Shakespeare, Jonson, the Wakefield Master, Dryden, Wycherly, Congreve, Sheridan, Shelley, Shaw, and others. Dramatic texts, theatrical conventions, social conditions, and their interrelationships.

374 Introduction to Film Analysis: Meaning and Value Summer or fall. 4 credits. Not offered fall 1984; next offered summer 1984 and 1985.
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. Fee for screening expenses, $10 (this fee is paid in class).
T R 2:30–5:30. 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). Not offered 1984–85; next offered 1985–86.
T R 2–5. 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 that 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 1984–85; next offered 1986–87. Fee for screening expenses, $10 (this fee is paid in class).
T R 2–5. 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 1984–85; next offered 1985–86. Fee for screening expenses, $10 (this fee is paid in class).
T R 2–5. D. Fredericksen.
Emphases on the contemporary documentary film as a socioplitical 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.]

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, S. Cole; 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.

398 Directing I Fall. 3 credits. Prerequisites: Theatre Arts 250 and 280 and permission of instructor.
M W 2:30–4:25. Staff.
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.

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 1984–85.]

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.
M W F 11:15.
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 instructor. Not offered 1984–85; next offered 1985–86.]

433 Dramaturgy: Play and Period Spring. 4 credits. Prerequisites: some theatre history and dramatic literature work at the 300 level or permission of instructor.
T 2:30–5. R. Gross.
An intensive study of the plays of Corneille and Racine and of their theatrical and cultural background. The course will cover 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. M. Hays.
An examination of the role theatre has played in society. This year the course will focus on the English "Blue-Book" dramatists of the nineteenth century and in particular on the work of Tom Tayler.

[435 Special Topics Spring. 4 credits. Prerequisite: some theatre history or dramatic literature work at the 300 level or permission of instructor. Not offered 1984–85; next offered 1985–86.]

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 first Tuesday of classes.
Staff.
Production experience involving full design and/or technical responsibility for a play or dance. Work will be supervised in a tutorial manner by appropriate faculty.

[462 Seminar in Lighting Design Spring. 4 credits. Prerequisite: Theatre Arts 362 and permission of instructor. Not offered 1984–85.
M W 12:20–2:15.
Selected topics in the history of lighting design style, the aesthetics of light and their role in play analysis, and the contribution of light to the establishment and manipulation of dramatic space.]

[464 Seminar in Scene Design Fall. 4 credits May be repeated for credit. Prerequisite: Theatre Arts 364 and permission of instructor. Not offered 1984–85.
M W 12:20–2:15. Scenic design faculty.
Selected topics in the history of design style, the changing nature and functioning of stage spaces, and the role of the scenic space in the establishment of a dramatic strategy for the play in production.]

[466 Seminar in Costume Design Fall. 4 credits May be repeated for credit. Prerequisite: Theatre Arts 366 and permission of instructor. Not offered 1984–85.
M W 12:20–2:15. Costume design faculty.
Selected topics in the history of costume design and its relationship to scenery and lighting, the integration of character analysis and dramatic structure, and the development of visual vocabulary with which to express cultural and psychological value systems.]

475 Seminar in the Cinema I (also College Scholar Seminar) Fall. 4 credits.
T R 10:10–12:05. D. Fredericksen.
Topic for 1984: Image is psyche. "Know thyself": it has been called our culture's most enduring psychological need, and it has been frequently offered as the *raison d'etre* for liberal studies. C. G. Jung's answer to how you might "know thyself" is based upon his claim that "image is psyche" and its informing metaphor is depth. The seminar will trace the elaborations of this position in Jung, James Hillman, Edward Casey, Mary Watkins, and others; it will also test the critical capacities of this position with respect to film images given us by Bergman, Fellini, Brakhage, Roeg, Gunvor Nelson, Suzan Pitt, Larry Jordan, Bruce Baille, and others. The manner in which Jung's claim might provide an archetypal and imaginal alternative to current approaches to liberal studies will be asked throughout the seminar; the nature of education will thereby become a central theme of the semester's work. Students are to have read Jung's autobiography, *Memories, Dreams, Reflections,* before the first class.

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.

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.

498 Directing II Spring. 4 credits. Prerequisite: Theatre Arts 398 or permission of instructor.
M W F 2:30–4:25.
Use of movement and space; character development techniques; rehearsal process; production procedures; applied project in performance.

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 2–3:50. 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.

[633 Seminar in Theatre History Spring. 4 credits. Not offered 1984–85; next offered 1985–86.]

636 Seminar in Dramatic Criticism Fall. 4 credits. Prerequisite: permission.
T 9–11:30. R. Gross.
Topic: the plays of Philip Barry, S. N. Behrman, and Robert Sherwood.

637 Seminar in Dramatic Theory Spring. 4 credits.
T 2:30–5. M. Hays.
An examination of the idea of the modern theatre found in the works of Maeterlinck, Pirandello, Artaud, and Brecht.

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 technqiue 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.

[672 Philosophy and Theory of Tragedy (also English 678) Fall. Not offered 1984–85; next offered 1985–86
T. Murray.]

[699 Seminar in the Theories of Directing Not offered 1984–85; next offered 1985–86]

700 Introduction to Research and Bibliography in Theatre Arts Fall. 1 credit. Enrollment limited to students in Theatre Arts 633 or 636.
T 9–11 30. R. Gross.
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.

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. P. Saul.
Development of the physical body for expression through various techniques and practice, including effort-shape; improvization; 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 training program. Others by permission of instructor.
M W 1–2:30. 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 training.
M W 2:45–4:25, T R 2:30–4:25. S. Cole.
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 training.
M W F 10:45–12, T R 1–2:15. E. Newman.
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. E. Newman.
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 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.

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.
Staff.
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.

880 Master's Thesis

990 Doctoral Thesis and Special Problems

Ukrainian

See Modern Languages, Literatures, and Linguistics, p. 176.

Vietnamese

See Modern Languages, Literatures, and Linguistics, p. 176.

Special Programs and Interdisciplinary Studies

Andrew D. White Professors-at-Large

The program has its origins in Cornell's early history. Andrew D. White, the first president of Cornell University, inaugurated the position of nonresident professor, to be held by eminent visiting scholars who would periodically visit the University in order to supplement the activities of the permanent University faculty. Professors-at-Large, who serve for a six-year term, are full members of the faculty when in residence.

Term Ending in 1985

Cone, Edward T., musicologist, composer. Princeton University
Thapar, Romila, historian. Jawaharlal Nehru University

Term Ending in 1986

Arigoni, Duilio, organic chemist. Eidgenössische Technische Hochschule, Zurich
Derrida, Jacques, philosopher, literary critic. Ecole Pratique des Hautes Etudes, College International de la Philosophie
Le Roy Ladurie, E., historian. College de France, Ecole des Hautes Etudes en Sciences Sociales

Term Ending in 1987

Antonioni, Michelangelo, film director
Greengard, Paul, neurophysiologist. Rockefeller University
Lovasz, Laszlo, mathematician. Eötvös Lorand University, Budapest
Rich, Adrienne, poet

Term Ending in 1988

Baxandall, Michael, art historian. The Warburg Institute
Borlaug, Norman E., plant scientist. International Maize and Wheat Improvement Center, Mexico
Garwin, Richard L., physicist. IBM Thomas J. Watson Research Center
Shaw, Margery W., geneticist, physician, lawyer. Institute for the Interprofessional Study of Health Law, Houston

Term Ending in 1989

Cox, David R., statistician. Imperial College of Science and Technology, London
Dover, Sir Kenneth, classicist. President, Corpus Christi College, Oxford
Szarkowski, John, curator and historian of photography. The Museum of Modern Art, New York
Woolhouse, Harold W., biologist. John Innis Institute, Norwich, and University of East Anglia

Term Ending in 1990

Heilbron, John L., historian of science. University of California at Berkeley
Lewis, Bernard, Islamicist. Princeton University
Welty, Eudora, novelist and short story writer

Africana Studies and Research Center

J. Turner, director; Y. ben-Jochannan, W. Cross (director of undergraduate studies, 310 Triphammer Road, 256-4625), L. Edmondson, A. Graves, R. Harris, 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 Africana Studies and Research Center offers a variety of courses that focus on African and Afro-American studies. Every Cornell student is encouraged to take courses at the center in order to understand better the nature of the racial discrimination and oppression as well as to gain an appreciation of Black culture and history. Since each faculty member represents a different discipline, the center offers the opportunity to study the Black experience in America from the vantage point of psychology, sociology, political economy, history, and drama.

The Africana Studies and Research Center 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 non-majors.

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, 455, 465.
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.

Courses

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. Edmondson.
This course directs attention to the salient characteristics of Africa's political systems and assesses the way in which continental and global factors impinge on development efforts. It is especially concerned with the impact of colonialism and the ongoing efforts by Africans to overcome its political and socioeconomic legacies. Among the specific issues to be discussed are problems of ethnic fragmentation, boundary problems, levels of political institutionalization, challenges of continental unity, neocolonialism and dependency, and Africa within the Third Word and in the world system.

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. Offered alternate years.
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. Offered alternate years.
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 politcal 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 alternate years. Staff.

303 Blacks in Communication Media and Film Workshop Spring. 3 credits.
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. Offered alternate years.
T R 1:25-2:15.
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. Offered alternate years.
Hours to be arranged.
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 of 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.
M W 9:05–11. L. Edmondson.
A study of the historical, geostrategic, political-economic, and social (including racial and cultural) forces bearing on the domestic and international experiences of Caribbean societies. Special attention will be given to conflicting definitions and perceptions of the Caribbean; contending theories of Caribbean social structure and models of development; the continuing salience of struggles for change and transformation; prospects of regional integration; and Caribbean challenges to the global system, especially with regard to the region's relations with the United States in the context of the East-West conflict and its position in the Third World in the context of the North-South cleavage.

352 Pan-Africanism and Contemporary Black Ideologies Spring. 4 credits. Offered alternate years.
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. R. Harris.
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. R. Harris.
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. L. Edmondson.
An exploration of the processes of African underdevelopment, ranging from historical foundations to contemporary international dynamics. Rival theories of underdevelopment, contending models of development, and competing ideologies will be explored. Common African postures as manifested in the "Lagos Plan of Action for the Economic Development of Africa, 1980–2000" and in the North-South dialogue will also be assessed.

[405 Political History of the Age of Booker T. Washington and W. E. B. DuBois Spring. 4 credits. Not offered 1984–85.
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 representative 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. Authors to be studied will include Laye, Oyono, Achebe, Soyinka, Armah, Abrahams, and Ngugi.

425 Advanced Seminar in Black Theatre Fall. 4 credits. Offered alternate years.
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.

455 Modern Caribbean Literature Spring. 4 credits.
W 2–4:25. A. Graves.
This course will examine the prose literature of the Caribbean islands. Through the reading of several novels and short stories from the various languages and cultural strains that comprise the Caribbean societies, students will study the points of commonality and the diversity within this body of literature. The recurrence of certain historical, social, and cultural issues that have formed the multi-ethnic Caribbean peoples will be analyzed in their varying manifestations across the linguistic and other boundaries to uncover the underlying shared experience.

460 History of African Origins of Major Western Religions Fall or spring. Offered alternate years. 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. Offered alternate years.
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 framwork 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 1984-85.
C. Mbata.]

550 Transnational Corporations in Africa and Other Developing Countries Spring 4 credits Prerequisites: upperclass or graduate standing or permission of instructor. Offered alternate years. 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.

598–599 Independent Study 598, fall; 599, spring. Variable credit. For all graduate students.

698-699 Thesis 698, fall; 699, spring. Limited to Africana Studies and Research Center graduate students.
Africana Center faculty.

American Indian Program

R. Fougnier, director (215 Stone Hall, 256-6587); S. Saraydar, asst. prof.

The American Indian Program (AIP) 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 AIP 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 AIP is to assist Indian groups and organizations in their efforts to address the issues they face. The thrust of the AIP's research and extension efforts is directed at developing solutions to problems identified by Indian people. In

this way the AIP 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 AIP 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 working with 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.

For full descriptions of the following courses consult the listings under individual departments.

Introduction

ALS 100 Introduction to American Indian Studies

The Indian Traditions

Anthropology 230 Ethnology of Native North America

Anthropology 354 The Peopling of America

Indians in Transition

ALS 318 Ethnohistory of the Northern Iroquois (also Anthropology 318)

History 119 History of North American Indians

History 209 Political History of American Indians

History 323–324 Native American History

History 429 American Indians in the Eastern United States

Contemporary Issues

Rural Sociology 175 Issues in Contemporary American Indian Societies

Rural Sociology 242 American Indian Philosophies I: Power and World Views (also Anthropology 242)

Rural Sociology 243 American Indian Philosophies II: Native Voices (also Anthropology 243)

Rural Sociology 367 American Indian Tribal Governments (also Anthropology 367)

Rural Sociology 440 Social Impact of Rapid Resource Development

Rural Sociology 442 American Indian Philosophies: Selected Topics (also Anthropology 442)

Independent Study

Independent study courses within departments; students must have approval of an American Indian studies faculty member.

Center for Applied Mathematics

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

Biology and Society Major

J. L. Ford, chairman, biology and society major, Program on Science, Technology, and Society (632 Clark Hall, 256-3810)

The biology and society major is offered to students enrolled in the College of Agriculture and Life Sciences, the College of Arts and Sciences, and the College of Human Ecology. The major is coordinated for students in all colleges through the biology and society office. Students can get information, specific course requirements, and application procedures for the major from the office in 632 Clark Hall.

Because the biology and society major is multidisciplinary, students must attain a basic understanding of each of the several disciplines it comprises: these include introductory courses in the fields of biochemistry, chemistry, mathematics, genetics, ecology, ethics, and history. In addition, majors are required to take three courses in biology and society, a set of electives, and a special senior seminar. Concentration areas incorporating these required courses are designed in consultation with faculty advisers to accommodate each student's individual goals and interests.

Acceptance into the major requires completion of the course sequence in introductory biology. Students in the process of completing this prerequisite may be admitted to the major on a *provisional* basis. It is the student's responsibility to assure that final acceptance has been granted Although only introductory biological science is a prerequisite for acceptance into the major, students will find it useful to have completed some of the other requirements (listed below) by the end of their sophomore year.

Students intending to major in biology and society must apply for final acceptance into the major during their sophomore year. Applications from juniors will be considered on a case-by-case basis only. Upper-division applicants should realize the difficulties of completing the major requirements in less than two years.

Major Requirements

1) Bio Sci 101–104 or 105–106. (109–110 does not meet this requirement.)
2) General chemistry (one year): Chem 103–104, 207–208, or 215–216.
3) College calculus (one semester): Math 106, 108, or 111, or any higher-level calculus course.
4) Biochemistry: Bio Sci 231, 330, or 331.
5) Ecology: Bio Sci 261 or 262.
6) History of Biology: B&Soc 287 (also Hist 287 and Bio Sci 201) or B&Soc 288 (also Hist 288 and Bio Sci 202).
7) Core course: B&Soc 301 (also Bio Sci 301 and Anthro 301).
8) An eight-course concentration area to include genetics, ethics, and statistics. It is to be developed by the student and his or her adviser. See below for course requirements and some suggested concentration areas.
9) Two Issues in Biology and Society courses selected from the list below.
10) Senior seminar.

Concentration Areas for the Major

Students accepted into the major must develop with their adviser a coherent and meaningful grouping of courses representative of their special interest in biology and society. Examples of biology and public policy concentration areas include agriculture and society, the environment and society, health and society, and human development and society. Sample concentration areas are available in the biology and society office.

Students must develop, in consultation with their advisers, their major concentrations from the following six categories:

1) a genetics course: Bio Sci 280 or 281, or Pl Br 225
2) an ethics course: B&Soc 205 (also Bio Sci 205 and Phil 245) or B&Soc 206 (also Bio Sci 206 and Phil 246)
3) a statistics course: Stats 200, I&LR 210, Ag Ec 310, Educ 352, Soc 301, Psych 350, Govt 391, Math 372, Econ 319, OR&IE 270, or Stats 601
4) any two additional biology elective courses* from Biological Sciences, Nutritional Sciences, Agricultural Sciences, Human Development and Family Studies, Psychology, Agronomy, Animal Sciences, Entomology, Food Science, Microbiology, Natural Resources, Plant Pathology, and Veterinary Medicine
5) *two* social science electives†
6) *one* humanities elective‡

*These courses must have substantial biology content. Not all courses in these areas satisfy this requirement.

†Issues in Biology and Society–Social Science courses may be used to meet this requirement.

‡Issues in Biology and Society–Humanities courses may be used to meet this requirement.

Issues in Biology and Society

This requirement is designed to help students achieve some breadth. Students must pass a total of two courses, one course from the natural sciences and one course from either the humanities or the social sciences. Students should consult with their adviser when choosing the courses to meet this requirement. A list of courses that may be used to fulfill the requirement can be obtained at the biology and society office.

Independent Study

Projects under the direction of a Biology and Society faculty member are encouraged as part of the program of study within the student's concentration area. Applications for research projects are accepted by individual faculty members. Students may enroll for 1–4 credits in Biology and Society 375 (Independent Study) with written permission of the faculty supervisor and may elect either the letter grade or the S-U option. Students may elect to do an independent study project as an alternative to, or in advance of, an honors project. Information on faculty research, scholarly activities, and undergraduate opportunities is available in the biology and society office, 632 Clark Hall. Independent study credits may not be used in completion of the major requirements

Honors Program

The honors program is designed to challenge the academically talented undergraduate student whose major is in biology and society. Students who enroll in the honors program are given the opportunity to do independent study and to develop the ability to evaluate research dealing with issues in biology and society. Students participating in the program should find the experience intellectually stimulating and rewarding.

Selection of Students

During the first three weeks of the fall semester seniors majoring in biology and society are considered for entry into the honors program by the Honors Program Committee. Applications for the honors program are available at the biology and society office, 632 Clark Hall. To qualify for the honors program, students must explain how the honors work will fit into their overall program. They must have an overall Cornell cumulative grade-point average of at least 3.00 and at least a 3.30 cumulative grade-point average in all courses used to meet the major requirements. Students in the College of Agriculture and Life Sciences must also meet the requirements of that college and be selected by one of the existing college committees.

If, after admission to the honors program, a student fails to maintain a high scholastic average, or if for any other reason(s) he or she is considered unsuited for honors work, the student reverts to candidacy for the regular bachelor's degree. The student who does not continue in the honors program receives credit for any work passed in the program but is not eligible for a degree with honors.

The opportunity for independent study (see above) is available to all students as an alternative to, or in advance of, an honors project.

Program Requirements

The satisfactory completion of a special project and the writing of an honors thesis are required. The project must include substantial research. The completed work should be of wider scope and higher quality than the work normally required for an advanced course.

Initiative for formulation of ideas, developing the proposal, carrying out the study, and preparation of a suitable thesis all lie with the student. Honors projects must be under the direction of two advisers, one from biology and society and the other a member of the Cornell faculty whose field of study corresponds with the student's topic. The purpose of the second adviser is to guarantee expertise in the subject matter covered by the thesis. Students in the College of Agriculture and Life Sciences must select this adviser from the area within which their thesis will be reviewed.

Students may take from 3 to 5 credits per term with up to a maximum of 8 credits in Biology and Society 499. They should enroll in Biology and Society 499 for one or both terms of their senior year, after consultation with the member of the Biology and Society faculty who has agreed to act as thesis adviser. Students are encouraged to enroll for both terms, to give them time to properly develop a project for the thesis. Students should note, however, that Biology and Society 499, because it is a special honors course, is to be taken in addition to those courses that meet the regular major requirements.

Honors Thesis

Students and their advisers should meet regularly during the period of research and writing for the honors thesis. The responsibility for scheduling these meetings, and for carrying out the research agreed upon, rests with the student. Advisers are expected to make themselves available for discussion at the scheduled times and to offer advice on the plan of research, as well as provide critical and constructive comments on the written work as it is completed. They are not expected, however, to have to pursue students either to arrange meetings or to ensure that the research and writing are being done on schedule.

There is no prescribed length for a thesis, since different topics may require longer or shorter treatment, but it should normally be no longer than seventy double-spaced, typed pages. When a thesis has been completed in a form generally satisfactory for purposes of evaluation, the candidate must meet with the thesis advisers and one member of the Honors Program Committee and formally defends the thesis. This should be no later than the last day of classes. Any student would be well advised, however, to provide reviewers with a polished draft at least four weeks prior to the last day of classes and defend his or her thesis well in advance of the end of classes, to allow time for revisions. A public presentation of the honors work to faculty and students will be scheduled at the end of the student's last semester.

Course Requirements

B&Soc 499 Honors Project Fall or spring. Credit to be arranged. Open only to biology and society honors students in their senior year.

Students enrolled in Biology & Society 499 will receive a letter grade at the end of their final term, whether or not they complete a thesis and whether or not they are recommended for honors. Students enrolled for the whole year in 499 may receive either a letter grade for both terms or a grade of "R" for the first term, with a letter grade for both terms submitted at the end of the second term. When a student is enrolled for two terms, the student and the thesis adviser must reach a clear agreement at the outset as to which grade will be assigned for the first term and on the basis of what sort of work. Minimally, an honors thesis outline and bibliography should be completed during the first term.

Evaluation and Recommendation

Two copies of the completed and defended thesis (suitably bound in a plastic or hard-backed cover), together with the advisers' recommendations, must be submitted to the Honors Program Committee by the first day of study period of the student's final term.

Following the formal defense of the thesis, the thesis advisers each submit to the Honors Program Committee a recommendation that includes (1) an evaluation of the honors work and the thesis; (2) an evaluation of the student's academic record in the biology and society major; and (3) a recommendation for or against awarding honors. (For College of Arts and Sciences students a justification for the level of honors proposed must be included.)

Copies of the thesis and recommendations will be circulated to the Honors Program Committee. Because the committee may have little knowledge of the subject or area of the thesis, letters of recommendation should be carefully prepared to help the committee ensure consistency within the honors program. Unless there is serious disagreement, the recommendation of the advisers should stand. If there is disagreement, the Honors Program Committee will make the decision after consultation with the interested parties.

Freshman Seminars

For up-to-date information consult the Freshman Seminar Brochure.

103 Writing as a Naturalist Fall. 3 credits.
Hours to be arranged. 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.

104 Ecosystems and Ego Systems Fall. 3 credits.
M W F 11:15. M. Gilliland.
When business interests, university research, and governmental regulations compete, how can we best answer questions of ethics? These questions arise when we consider agricultural land use, environmental quality, and genetic engineering. Underlying them are other, larger questions of purpose and perspective: Do human values conflict with nature's values? How does the prism of culture influence the decisions we make? The seminar will emphasize critical reading and the writing of expository essays and reports. Texts will include writings by biologists, governmental agencies, historians of science, journalists, philosophers, poets, and theologians.

105 Health Dialogues: Personal and Political Fall. 3 credits.
T R 8:40–9:55. L. Nelson.
In this course we will survey critically the evolving—and often contentious—dialogue about how to define, protect, and enhance individual and collective health. We will look at inner dialogues, cultural processes, and scientific debates; at public discourse ranging from drugstore paperback exposes to imposing scientific conferences; at topics ranging from individual ability to "fight" one's own cancer to governmental responsibility for radiation exposure.

General Undergraduate Courses

205 Biomedical Ethics (also Biological Sciences 205 and Philosophy 245) Fall. 3 credits. Primarily for sophomores, juniors, and seniors; permission of instructor required for graduate students.
Lecs and discs, M W F 1:25. M. Wachsberg.
The course analyzes conceptual frameworks in which ethical problems in biology and medicine can be understood, debated, and resolved. General topics (with sample issues) include key medical concepts (e.g., illness, death, personhood, mental illness), professional-patient relationships (e.g., medical paternalism, patient rights, informed consent, confidentiality), reproductive issues (e.g., contraception, abortion, genetic screening, eugenics), medical resource allocation (e.g., health-care rights, cost-benefit analysis, alternative health care systems.

214 The Biological Basis of Sex Differences (also Biological Sciences 214 and Women's Studies 214) Spring. 3 credits. (4 credits with weekly discs, to be arranged during first week of classes). Enrollment limited. 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.

232 Recombinant DNA Technology and Its Applications (also Biological Sciences 232) Spring. 2 or 3 credits. Prerequisite: one year of introductory biology. S-U grades optional.
Lecs, W F 11:15; disc, M 11:15. F. Buttel, J. Calvo, J. Fessenden-Raden.
Throughout, an attempt will be made to give an intelligent layperson the background needed to

understand some new research discoveries and applications stemming from them. Concepts from molecular biology and molecular genetics that underlie recombinant DNA technology will be discussed, together with the strategies used today in cloning genes. Examples will emphasize the vital link between basic research, often esoteric in nature, and modern biotechnology. Applications to be discussed from multidisciplinary perspectives include insulin, interferon, blood clotting factors, growth hormones, vaccines, screening for genetic diseases, feedstock chemicals, and plant improvement. Scientific, historical, regulatory, social, and ethical issues will form the basis of the discussions.

[287 History of Biology (also History 287 and Biological Sciences 201) Fall. 3 credits. Prerequisite: one year of introductory biology. S-U grades optional. Not offered 1984–85.
Lecs, T R 10:10-11:30. W. Provine.]

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. Staff.
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 by arrangement with instructor). Prerequisite: one year of introductory biology. S-U grades optional. This is part of the two-semester core-course requirement 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.
In modern evolutionary theory, human biology, behavior, and institutions are understood as the ongoing products of interactions between human biological evolution and cultural change. Nevertheless, numerous attempts to examine the evolutionary processes in humans violate key tenets of evolutionary theory, unwittingly reproducing elements of pre-Darwinian views of human nature. After reviewing the pre-Darwinian context and reading *The Origin of Species*, the course explores attempted applications of evolutionary analysis to humans and develops a cultural explanation of the persistence of pre-Darwinian elements in many of them.

302 Alternative Food-Production Systems (also Biological Sciences 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 or Biology and Society 304 fulfills the second-semester core-course requirement for the biology and society major and is also open to other students who have taken 301. There is a possible fee for course reading material.
Lecs, T R 12:20–1:40. 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 Environmental Chemicals and Maladies (also Biological Sciences 304 and Toxicology 304) Spring. 3 or 4 credits (by arrangement with instructor). Prerequisite: Biological Sciences 301 or permission of instructor. S-U grades optional. This or Biology and Society 302 fulfills the second-semester core-course requirement for the biology and society major and is also open to other students who have taken 301. There is a possible fee for course reading material.
Lecs, T R 10:10–11:30. J. Fessenden-Raden.
Toxic chemicals as real and potential occupational and/or environmental health hazards will be studied from a multidisciplinary perspective. A molecular biological-biochemical examination of the effects of specific chemicals as they relate to cancer and reproductive impairments will be discussed, together with the strategies for validating risk. Scientific data and testing methodologies for mutagens, teratogens, and carcinogens, along with social, public policy, and ethical issues will be critically analyzed. Lectures with assigned readings will be followed by discussion sessions.

311 Issues in Biology and Society: Professional Ethics Spring. 4 credits. Limited to 20 students. Prerequisite: permission of instructor. There is a possible fee for course reading material.
R 2:30-4:25. 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 and permission of instructor.
R 2:30-4:30. D. J. Greenwood.
An examination of contemporary medical systems from an anthropological perspective and an evaluation of current approaches to the anthropology of medicine.

327 Health and Disease (also German Literature 327) Fall. 4 credits. Limited to 20 students. No prerequisites. S-U grades optional. Offered alternate years.
M 1:25–3:20. S. L. Gilman.
Everyone knows what health and disease are. Or do they? This Common Learning course on health and disease will explore some of the cultural, psychological, philosophical, anthropological, medical, economic, and political dimensions of these concepts to show how various models of disease function in contexts from business to engineering, from the military to the medical profession. The course will be divided into two segments: the first will examine the general implications of concepts of health and illness; the second will study these general principles as reflected in the definition, treatment, and mythmaking surrounding one specific disease: schizophrenia. The course will draw on specialists from throughout the University.

347 Human Growth and Development: Biological and Social Psychological Considerations (also Human Development and Family Studies 347 and Nutritional Sciences 347) Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109or 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

[401 Seminar in the History of Biology (also History 447) Fall. 4 credits. No prerequisites. Not offered 1984–85.
W. Provine.]

[402 Seminar in the History of Biology (also History 448) Spring. 4 credits. No prerequisites. Not offered 1984–85.
W. Provine.]

403 Introduction to Public Health (also Human Service Studies 662) Fall. 4 credits. S-U grades optional.
M W F 10:10 plus one hour to be arranged.
J. L. 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.

404 Human Fertility in Developing Nations Spring. 4 credits. Prerequisite: Sociology 230 or permission of instructor. Offered alternate years.
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.

[405 Special Problems in the Anthropology of Sex and Gender (also Anthropology 422 and Women's Studies 422) Fall. 4 credits. Not offered 1984–85.
K. S. March.]

[408 Agriculture, Society, and Biotechnology (also Rural Sociology 405) Spring. 3 credits. Prerequisites: two courses in the social sciences and three courses in the biological or agricultural sciences. Not offered 1984–85.
F. H. Buttel.]

409 Foundations of Social Policy: Implications for Economic Growth (also Management NBA 685) Fall. 3 credits.
Lecs to be arranged. R. M. Battistella.
Contemporary social policy issues, such as health care, welfare services, and social security, are assessed in the light of industrial and postindustrial priorities. The construction of a multidisciplinary analytical framework for understanding and coping with complex policy issues is a leading objective of the course.

412 Agriculture, Society, and the Environment (also Agriculture and Life Sciences 469 and Biological 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.

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, P. Cheng, J. Cole, 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, J. Nickum, C. A. Peterson, 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, 155 Goldwin Smith Hall, 256-3386

The College Scholar program is described in the introductory section, p. 98.

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.

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 must consult the Freshman Seminar brochure available from college registrars before fall and spring registration. For more information about the Freshman Seminar Program and its requirements, see pp. 14–15.

Africana Studies

For full descriptions of the following courses see Africana Studies and Research Center, pp. 207–208.

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 full descriptions of the following courses see Anthropology, pp. 103–104.

121 Encounters with Other Cultures Spring. 3 credits.
B. Lambert.

127 Anthropology of the Arts. Fall. 3 credits.
M. Roseman.

130 Apes and Languages Fall or spring. 3 credits.
B. Lantz and staff.

Archaeology

For full descriptions of the following courses see Archaeology, p. 107.

105 Archaeology as Heritage Fall or spring. 3 credits.
B. Lantz.

107 Popular Archaeology Spring 3 credits.
M W F 1:25. Staff.

Asian Studies

For full descriptions of the following courses see Asian Studies, p. 109.

101 Women and Social Transitions in the Twentieth Century Fall. 3 credits.
M W F 1:25. C. Oshetsky.

[104 Three Ways of Thought Fall. 3 credits Not offered 1984–85]

[105 Feminine and Masculine Ideals in Japanese Culture Spring. 3 credits. Not offered 1984–85.]

Biology and Society

Course descriptions may change slightly. For full details, consult Freshman Seminar Program publications.

101 Sight into Insight Spring. 3 credits.
Staff.
It does not take much experience in the world before we realize that we do not all see things the same way. But often, in this age of specialization, we lose sight of what determines the quality and character of our individual visions. In this course we will examine the reciprocal influences of what we see and what we understand and believe. Our discussions of the topic will range from the literal to the metaphorical, and readings will proceed from an introduction to the physiology of the eye to explorations of perceptions and perspective by scientists, artists, philosophers, psychologists, and sociologists. Readings by such writers as R. L. Gregory, T. Nagel, D. Hostadter, and others. Writing will be based upon the texts and upon students' own thinking and observation.

103 Writing as a Naturalist Fall. 3 credits.
T R 2:30–3:45. 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.

104 Ecosystems and Ego Systems Fall. 3 credits.
M. Gilliland.
When business interests, university research, and governmental regulations compete, how can we best answer questions of ethics? These questions arise when we consider agricultural land use, environmental quality, and genetic engineering. Underlying them are other, larger questions of purpose and perspective: Do human values conflict with nature's values? How does the prism of culture influence the decisions we make? The seminar will emphasize critical reading and the writing of expository essays and reports. Texts will include writings by biologists, governmental agencies, historians of science, journalists, philosophers, poets, and theologians.

105 Health Dialogues: Personal and Political Fall. 3 credits.
T R 8:40–9:55. L. Nelson.
In this course we will survey critically the evolving—and often contentious—dialogue about how to define, protect, and enhance individual and collective health. We will look at inner dialogues, cultural processes, and scientific debates; at public discourse ranging from drugstore paperback exposes to imposing scientific conferences; at topics ranging from individual ability to "fight" one's own cancer to governmental responsibility for radiation exposure.

Classics

For full descriptions of the following courses see Classics, p. 120.

120 Freshman Seminar in Latin Literature Fall. 3 credits.
Staff.

121 Freshman Seminar in Classical Archaeology Fall or spring. 3 credits.
Staff

150 Freshman Seminar in Greek and Roman Myths Fall or spring. 3 credits.
Staff.

Comparative Literature

Individual sections of each course may vary. For information about courses and class meeting times consult the Freshman Seminar brochure.

102 Tales of Mystery, Quest, and Self-Discovery Fall or spring. 3 credits.
Staff.
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 or spring. 3 credits.
K. Shea and staff.
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.

104 The Heroine in Literature Fall or spring. 3 credits.
Fall: M W F 9:05, M. Proctor. Spring: staff.
This course will focus on the concept of the heroine as it is presented in specific works. Discussion will address questions such as: What is a heroine? Is she different from a hero? To what extent is the literary concept influenced or determined by the social environment? Is the concept affected by the sex of the author? Students write critical papers on such authors as Shakespeare, Austen, Bronte, and Woolf.

[105 The Hero in Literature Fall or spring. 3 credits. Not offered 1984–85.
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 Spring. 3 credits.
W. Cohen.
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.

109 Literature and Other Disciplines Fall. 3 credits.
M W F 9:05. W. Kennedy.
Different disciplines require different types of reading skills and writing techniques. The aim of this seminar is to isolate a set of problems from three literary texts and to compare the solutions in the fields of history, psychology, and sociology. The texts are Shakespeare's *Antony and Cleopatra*, Dostoevsky's *Notes from the Underground*, and Proust's *Swann's Way*. Topics for papers will address issues of how various disciplines assess primary data and how to evaluate the achievements in each discipline.

English

For information about class meeting times consult Freshman Seminar Program publications.

105 Women and Writing (also Women's Studies 106) Fall and spring. 3 credits each term.
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 Freshman Seminar brochure. 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 Fall or spring. 3 credits
Fall: D. Fried and staff. Spring: S. P. Mohanty and staff.
A writing course that focuses on film. Why do movies delight or disturb us? How is a movie put together so that it will manipulate and move its audience? What makes a movie effective? We will explore these questions through the study of six films from such categories as Hollywood comedies, Hitchcock thrillers, musicals, westerns, and foreign classics. Students must purchase a discount pass ($12) for admission to two required screenings of each of the six films; these screenings will be scheduled for one evening and one afternoon about every two weeks. We will also analyze videotapes of the films in class. We will read a variety of short essays on the history, analysis, and evaluation of film. Writing assignments will include short exercises designed to sharpen the student's attention to each of the films and five papers (averaging four pages in length) on topics such as the relations between men and women as represented in these films, the appeal of movie stars, the results of transferring a stage play to the screen, and the style of a director. Students will also write at least one film review. Films taught in recent semesters have included *His Girl Friday*, *The Maltese Falcon*, *Rules of the Game*, and Hitchcock's *The Thirty-nine Steps* and *Psycho*.

115 The State of the Language Spring. 3 credits.
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, obscenity, 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 or spring. 3 credits
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 notice certain recurring topics or themes: sources of political power and of human rights, concepts of civility, conflicts of loyalty (love vs. honor, individuals vs. institutions, and various ideas of order and rebellion. We write brief expository essays, amounting to some thirty pages (*including* some rewrites), on questions raised by our study of the plays. Emphasis falls equally on reading and writing.

133 Forms of the Essay Fall or spring. 3 credits.
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 or spring. 3 credits.
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 or spring. 3 credits.
Staff.
This course will help you learn to write clear and graceful answers to questions about what you have read, a skill useful for your other courses and for your future professional work. Each week you will write a short interpretive essay in response to readings chosen for their relevance to the question, How do we know? and written by such provocative and important thinkers as Margaret Lawrence, Annie Dillard, Rose Goldsen, Martin Luther King, Niccolo Machiavelli, and Carl Sagan.

141 The Bible and Ancient Authors Fall or spring. 3 credits.
Staff
Writing about, reading, and discussing 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 or spring. 3 credits.
L. Bogel and staff.
Special topic for 1984–85: literature, games, and play. We will read and write about modern literature that explores the nature of games and play, their place in various cultures, and their function in the presentation of oneself in various societies. Modern writers repeatedly envision man as a role player, a game player, or a token in a game being played. Some literary structures imitate known game structures; some fictional characters execute game-like patterns; some authors involve their readers in literary games, playing with our expectations and responses. What are some language games? How is parody a game? How do games condense, or offer alternatives to, "serious" life? Readings will include such writers as Flannery O'Connor, Tom Stoppard, Samuel Beckett, William Faulkner, Jorge Borges, Thomas Mann, D. H. Lawrence, John Barth, and Vladimir Nobokov. Frequent short analytical papers, whose strengths and problems we will discuss in class and in conference.

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 may include James (short fiction), Twain *(Huckleberry Finn)*, Wharton *(The House of Mirth)*, Hemingway *(The Sun also Rises)*, Faulkner *(Go Down Moses)*, Wright *(Native Son)*, and Morrison *(Sula)*.

165 Fantasy Fall or spring. 3 credits.
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 or spring. 3 credits. Students should register with the Department of English, not the Freshman Seminar Program.
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 or spring. 3 credits. Students should register with the Department of English, not the Freshman Seminar Program.
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 or spring. 3 credits. Students should register with the Department of English, not the Freshman Seminar Program.
Staff.
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. 163.

107 Growing Up in Germany: Adolescence and Young Adulthood Fall. 3 credits.
T R 12:20–1:35. M. Totten.

109 Folk Tales and Folk Poetry Fall or spring 3 credits.
Staff.

151 Kafka, Hesse, Brecht, and Mann Fall or spring. 3 credits.
Staff.

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 Power and Politics Fall or spring. 3 credits.
Staff.
Selected topics analyzing current and vital issues in the public arena. Some seminars will emphasize national themes and others will deal with international concerns. Occasionally seminars will be offered that investigate power and politics from a historical or philosophical perspective.

100.1 Labor in American Politics Fall. 3 credits.
M. Goldfield.
This seminar will examine the impact of organized and unorganized labor on American politics. We will start with the pre–Civil War period, then discuss abolitionism, reconstruction, the 1886 May Day strikes, the pardoning of the Haymarket martyrs, the Pullman strike, Joe Hill's hanging, and the post–World War I Palmer raids. We will then attempt to place the current position of labor in American politics by analyzing the relation of the Congress of Industrial Organizations (CIO) to the Roosevelt coalition, the interaction of the labor unions and the civil rights movement in the 1960s, and the current position of organized labor.

100.2 Economic Democracy—A Potential Industrial Policy for the U.S.? Fall. 3 credits.
D. Hathaway.
In the face of declining industrial employment, many U.S. workers are attempting to buy back their jobs and get control of their companies. Some urge taking over companies before absentee owners allow the company's profitability to decay or ship the current job overseas. Others urge the need for workplace democracy to enhance the dignity of workers. Still others assert the need to democratize the decisions guiding investments throughout the economy, arguing that these decisions are as fundamental as any now made in Washington. After taking a brief look at some of the problems facing workers in the U.S. economy, this course will explore these proposals, drawing on the experiences of workers in Sweden, Chile, and the Mondragon region of Spain to supplement the U.S. experience.

100.3 South Africa—Racism and Resistance Fall. 3 credits.
C. Brown.
This seminar will examine contemporary South African politics. Topics to be covered include the historical development of white racism and black resistance, contemporary issues in education, labor relations, constitutional change, South Africa's relations with its majority-rule neighbors, and international reactions to apartheid.

100.4 Literature and Politics Fall. 3 credits.
S. Cohen.
What can literature teach us about politics? Why is it that fiction can sometimes reveal truths about political life that empirical studies and philosophical treatises miss? One answer is that without a deep understanding of people we can't understand politics nor can we know what makes for a just political order. Literature illuminates human nature in a way that neither numbers nor abstractions can. The novels and plays in this course will be read, then, for their perceptions about human nature and the political implications of these perceptions, as well as for their insights into such issues as imperialism, "getting back to nature," and women's rights.

100.5 Anarchy in the U.S.—Is the State Necessary? Fall. 3 credits.
F. Brooks.
In this course we will examine one of the most fundamental questions of political theory: Is the state necessary? First, we will examine a few of the traditional arguments for the state (Plato, Hobbes, Locke, Marx). This brief survey will provide a framework within which to consider critiques of the state by anarchists such as Bakunin, Kroptkin, Goldman, Bookchin, and David Friedman. After struggling with the theoretical arguments for and against the state, we will turn to various visions of stateless society. The materials used in this section of the course will be rather eclectic, including ethnologies, a novel, and possibly some case histories. This variety of texts should allow us to weigh the claims made for stateless societies by anarchist theorists. Problems to be addressed include the maintenance of social order, satisfaction of material needs and desires, the division of labor, and external defense.

100.6 Terror and Repression in Modern Ireland (1968–1983) Fall. 3 credits.
D. Maguire.
This course will center on the evolving relationship between nationalist resistance and state response in Northern Ireland since the outbreak of "the troubles" in 1968. Particular attention will be given to the rise of the civil rights movement in 1968, the introduction of internment in 1971, the birth of the Provisional IRA, the collapse of the Northern Ireland state in 1972, and subsequent attempts to introduce "a constitutional settlement."

100.7 Liberalism and the Rule of Law Fall 3 credits.
M. Greve.
Liberalism is committed to both democracy and the rule of law. The tension between them has characterized American politics from the very beginning. This seminar will examine the liberal tradition in America. We will focus on the ideas of constitutionalism and the rule of law, addressing both the theory of liberal law and its development in American history.

History

For full descriptions of the following courses, and for the Department of History's many additional Freshman Seminars, see History, pp. 142–143, and Freshman Seminar Program publications each term.

[104 Communes and Utopias: Alternative Life-Styles in American History Fall. 3 credits. Limited to 15 students. Not offered 1984–85.
G. C. Altschuler.]

[106 Democracy and Education: History of Learning in America Spring 3 credits. Not offered 1984–85.
M W 2:30. G. C. Altschuler.]

154 Religion and Reform: Ideas of Community from the New Testament to New England Fall 3 credits.
J. Rondeau.
Christian ideas have had powerful impact on the development of notions of community in the Western world. This course explores a number of different ideal communities, from the earliest Christians through the nineteenth-century Mormons, by means of readings and discussions of primary sources in translation. Writing assignments will consist of close readings of texts assigned for class discussion, comparisons of texts, and occasional, brief, in-class exercises.

192 Japan and the West: The Japanese in World War II Fall. 3 credits. Prerequisite: permission of instructor.
J. V. Koschmann.

[193 China and the West before Imperialism Spring. 3 credits. Open to freshmen and sophomores. Prerequisite: permission of instructor. Not offered 1984–85.
C. A. Peterson]

History of Art

For full descriptions of the following courses see History of Art, p. 150.

103 Freshman Seminar in Visual Analysis Fall or spring. 3 credits.
Staff.

104 How to Look at Works of Art Fall. 3 credits
Not open to students who have taken History of Art 103.
Staff.

Hotel Administration

For a full description of the following course see Hotel Administration, Communication Courses, p. 297.

165 Introduction to Writing for Business Fall or spring. 3 credits. Each section limited to 20 students.
D. A. Jameson.

Medieval Studies

For full descriptions of the following courses see Medieval Studies, p. 220.

101 The Literary Adventure of the Middle Ages
Fall or spring. 3 credits.
S. McEntire.

102 King Arthur and His Knights Fall or spring. 3 credits.
Staff.

103 Medieval Fantasy and Science Fiction Fall or spring. 3 credits.
Staff.

Modern Languages and Linguistics

English

For a full description of the following course see Modern Languages, Literatures, and Linguistics, English, p. 159.

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 description of the following course see Modern Languages, Literatures, and Linguistics, Linguistics, p. 168.

113–114 Hispanic Bilingualism 113, fall; 114, spring. 3 credits each term. Linguistics 113 is not a prerequisite for 114.
M W F 1:25. I. Almirall-Padamsee, D. F. Solá.

Music

For full descriptions of the following courses, see Music, p. 177.

111 Sound, Sense, and Ideas Fall or spring. 3 credits.
M W F 10:10 or 11:15. Staff.

113 Opera Spring. 3 credits.
M W F 2:30. N. Zaslaw.

Near Eastern Studies

For full descriptions of the following courses see Near Eastern Studies, p. 180.

[125 Freshman Seminar in Biblical Literature: Heroes and Heroines of the Bible Fall. 3 credits. Not offered 1984–85]

126 Society, Economy, and Religion in Ancient Israel: King David's Jerusalem Spring. 3 credits.
D. Deuel.

[154 Harems, Houris, and Hashish: Western Perceptions of the Middle East Spring. 3 credits. Not offered 1984–85.
D. Powers]

[157 Of Oil, Arms, and Anguish Not offered 1984–85.
P. Molan.]

Philosophy

For descriptions of philosophy seminars offered in the spring, consult Freshman Seminar Program publications. Past topics have included contemporary moral problems, economic justice, science and pseudoscience, the nature and existence of God, theories of the mind, objectivity and reality in scientific theorizing, and others.

100.1 Some Problems about God Fall. 3 credits.
C. Roberts.
This course will focus on a cluster of metaphysical and epistemological problems concerning God's existence. What kind of evidence is there for God's existence? How far can we get on faith? Both the theist's and atheist's positions will be considered. Readings will be drawn from both medieval and modern sources.

100.2 The Mind's I Fall. 3 credits.
M W F 11:15. C. Ginet.
We will read and discuss material in *The Mind's I, Fantasies and Reflections on Self and Soul*, compiled and arranged by Hofstadter and Dennett. From the preface: "What is the mind? Who am I? Can mere matter think or feel? Where is the soul? Anyone who confronts these questions runs headlong into perplexities. We conceived this book as an attempt to reveal those perplexities and make them vivid . . . the book . . . is designed to provoke, disturb, and befuddle its readers."

100.3 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 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 eight short papers, at least one of them a dialogue. Readings will include dialogues by Plato, Hume, and some contemporary writers.

100.4 Mind and Self Fall. 3 credits.
W. Barnett.
Following a brief survey of important philosophical accounts of mind and self, in which we will read short excerpts from the writing of such philosophers as Descartes, Locke, Hume, Mill, and Armstrong, we will consider a number of issues concerning the concept of mind as presented in the book *The Mind's I: Fantasies and Reflections on Self and Soul*, edited by Hofstadter and Dennett. The readings range from short fiction to philsophical essays; they are both thought-provoking and entertaining. Among the philosophical issues we will consider are the relation of mind to body; the relation of mind to self or personal identity; the possibility of artificial intelligence and the efficacy of the so-called computer model for explaining the operation of the human mind; the subjective nature of mind and its implications for various philosophical explanations of mental phenomena; the "problem of other minds," i.e., the basis upon which we ascribe mental states and processes to other creatures (or artifacts).

100.5 Philosophical Problems Fall. 3 credits.
S. Sullivan.
In this seminar we will focus on the relation between religion and morality. The specific questions we will discuss include the following: Is it true that, as Dostoevsky's Ivan Karamazov proclaims, "If there is no God, everything is permitted?" Is the existence of the evil there is in the world compatible with the existence of an all-knowing, all-powerful, morally perfect God? Is the existence of human freedom compatible with the existence of such a God? What is the relevance, if any, of religion to morality if the two are not compatible?

100.6 Philosophical Classics Fall. 3 credits.
T R 10:10–11:25. S. Shoemaker.
In this seminar we will read representative works by several influential philosophers (Plato, Descartes, Berkeley, Hume, J. S. Mill, and Bertrand Russell) concerning the foundations of ethics, religion and our knowledge of reality. There will be about eight papers assigned.

100.7 Utopian Thought and Value Theory Fall 3 credits.
D. Brink.
Utopian novels provide conceptions of ideal ways of life and forms of social organization. Utopian thought, therefore, raises fundamental questions of moral and political philosophy. What kind of life is valuable? What are our obligations to others? What is the proper role of government? What does distributive justice demand? Particular utopias provide explicit and implicit answers to such questions. While utopian novels do address and provide answers to such questions, these answers are not always fully defended. Moral and political philosophy, by contrast, addresses these questions in a systematic way. We will read a number of utopian novels, both ancient and modern (Plato's *Republic*, Bellamy's *Looking Backward*, and Morris' *News from Nowhere*), and see to what extent their claims about personal and social ideals are philosophically defensible. To structure our thought about these moral and political issues, we will also read and discuss the work of classical and contemporary moral and political philosophers (such as Mill, Marx, Rawls, and Nozick). A number of short papers will be assigned, at least one of which will be rewritten.

100.8 Science and Pseudoscience Fall. 3 credits.
T R 2:30–3:35. R. Boyd.
We will examine some of the basic questions concerning the nature of science: What are the aims of scientific inquiry? What is the scientific method, and what makes it "scientific?" What distinguishes scientific thinking from unscientific thinking? What questions—if any—lie beyond the scope of science? We will try to answer these questions by focusing on several topics from the history of science and on a variety of contemporary issues. Historical topics will include the Copernican revolution, the development of Newtonian theory, and the development of Darwin's theory of evolution. More recent issues will include Skinner and behaviorism, the I.Q. controversy, and "scientific creationism."

100.9 Topics in Moral Psychology
T. Lowe.
In this seminar we will explore a cluster of related topics in ethics and moral pyschology. We will look at different ways to approach moral questions, discuss the natures of pleasure and happiness, and explore the relation between moral values and personal values. Readings will include several philosophical classics (works by Plato and J. S. Mill), a number of essays by contemporary writers, and several literary works (including *The Age of Innocence*, by Edith Wharton).

Russian Literature

103 Freshman Seminar: Classics of Russian Thought and Literature Fall or spring. 3 credits each term.
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 or spring. 3 credits.
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 or spring. 3 credits.
Staff.
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, pp. 221–222.

101 Science as Literature: Science as *Metier* Fall or 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. 196.

100.1 Mass Media and Society Fall. 3 credits
T R 8:40–9:55. R. K. Goldsen.

[100.2 The Social Order in Detective Fiction Spring. 3 credits. Not offered 1984–85.
M W 8:40. S. Caldwell.]

100.3 Sociology of Organizations Fall. 3 credits.
M W F 9:05. D. Fish.

[100.4 The Family Spring. 3 credits. Not offered 1984–85.
T R 8:40–9:55]

100.5 Work Life and Change in America Fall 3 credits.
K. Westby.

100.6 Ethnicity and Bilingualism Spring. 3 credits.
E. Acevedo.
See also Linguistics 113–114.

Theatre Arts

For full descriptions of the following courses see Theatre Arts, p. 202.

130 American Myth in Drama Fall or spring. 3 credits.
R. Jones.

140 From Script to Stage: Writing about the Theatrical Process Fall or spring. 3 credits.
Sec 1, M W F 9:05; sec 2, M W F 10:10. D. Graver, K. Langford.

150 Looking at Dance Fall. 3 credits.
J. Morgenroth.

Women's Studies

See Freshman Seminar publications.

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. All students receiving a grade of S will be granted credit toward graduation. Students whose writing displays sufficient competence will also be granted Freshman Seminar credit. 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. Edmonston (demography/epidemiology), B. Finlay (psychology), 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 in a broad context. The human biology curriculum is of particular relevance to undergraduate students in premedical and predentistry programs, biological anthropology, nutrition, human development, ecology and systematics, psychology, physiology, genetics, and the health-related sciences. It serves to bring together students with a common interest in humankind as defined from these diverse fields and to provide a forum for student-faculty interaction on various topics relating to human evolution and biological diversity. Human Biology is not a major but a curriculum of study that provides majors in various departments with a program for selecting elective courses that deal with the biology of the human species. Students in their junior year may develop a program of study in human biology while majoring in a number of different departmental fields.

Basic Requirements

The requirements for a program of study in human biology are designed to 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 or 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 deparment 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 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.

HSS 315 Human Sexuality: A Biosocial Perspective 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 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 275 Human Biology and Evolution Fall. 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, 155 Goldwin Smith Hall, 256-3386
The Independent Major Program is described in the introductory section, pp. 97–98.

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.

Intensive English Program

E. J. Beukenkamp, director

This full-time, noncredit, non–degree 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.

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, 160 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. At least a semester of study abroad is advised.

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, 160 Uris Hall.

Center for International Studies

See "Interdisciplinary Centers and Programs," pp. 9–10.

Program of Jewish Studies

S. Katz, director and undergraduate adviser (Near Eastern and Jewish history and religion), 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 (ecology of man and landscape in Israel and the Middle East), D.I. Owen (Near Eastern and ancient Jewish history), 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 throughout the University provide breadth to the program by offering courses in related areas of study.

Courses Offered 1984–85

Elementary Modern Hebrew I and II (Near Eastern Studies 101–102)

Elementary Classical Hebrew (Near Eastern Studies 121–122)

Society, Economy, and Religion in Ancient Israel: King David's Jerusalem (Near Eastern Studies 126)

Intermediate Modern Hebrew (Near Eastern Studies 201–202)

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)

The Holocaust: European Jewry, 1933–1945 (Near Eastern Studies 241) Spring.

The Holocaust in Historical Perspective (Near Eastern Studies 241.1) Summer.

The History and Archaeology of Ancient Israel to 450 B.C.E. (Near Eastern Studies 243)

Introduction to Classical Jewish History (Near Eastern Studies 248)

Introduction to Modern Jewish History (Near Eastern Studies 249)

Modern History of the Middle East: Changing Politics, Society, and Ideas (Near Eastern Studies 294 and Government 358)

Political Concepts in the Modern Middle East: Traditional Legacy and Western Inspiration (Near Eastern Studies 298)

Advanced Modern Hebrew I and II (Near Eastern Studies 301–302)

Readings in Akkadian Texts: Nuzi Dialect (Near Eastern Studies 336)

Jews of Arab Lands (Near Eastern Studies 346)

Introduction to Field Archaeology in Israel (Near Eastern Studies 364) Summer.

Jewish Workers in Europe and America, 1789–1948 (Industrial and Labor Relations 381)

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 1984–85

Elementary Modern Hebrew (Near Eastern Studies 103) Summer.

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)

Masterpieces of Jewish Literature (Near Eastern Studies 204–205 and Comparative Literature 204–205)

Aramaic (Near Eastern Studies 238)

The Emergence of the Modern Jew: 1648–1948 (Near Eastern Studies 245)

Ancient Seafaring (Near Eastern Studies 261 and Archaeology 275)

Introduction to Biblical Archaeology (Near Eastern Studies 263)

Women in Jewish Literature: Tradition and the Literary Imagination (Near Eastern Studies 291 and Comparative Literature 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)

Undergraduate Seminar in Biblical Literature: Prophecy in Ancient Israel (Near Eastern Studies 322)

Agnon and Hazaz (Near Eastern Studies 308)

Ancient Near Eastern Literature (Near Eastern Studies 332)

Ugaritic (Near Eastern Studies 337)

Special Topics in Near Eastern Studies (Near Eastern Studies 341–342)

Age of the Patriarchs (Near Eastern Studies 344)

Interconnections in the Eastern Mediterranean World in Antiquity (Near Eastern Studies 361)

The History and Archaeology of Ebla (Near Eastern Studies 362)

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 the Ancient Near East (Near Eastern Studies 366 and Archaeology 310)

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)

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)

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. Goldsen, 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. Santí, D. Sola, 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 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

S. Jasanoff, director, 632 Clark Hall, 256-3810 (science, technology, and society), J. Bennett (philosophy), C. Bohmer (sociology), C. Carmichael (comparative literature), C. Greenhouse (anthropology), G. Hay (economics), C. Holmes (history), M. Katzenstein (government), D. B. Lyons (philosophy), M. B. Norton (history), R. Polenberg (history), D. Powers (Near Eastern studies), J. Rabkin (government)

Undergraduates in the College of Arts and Sciences can major in law and society through the College Scholar or Independent Major Programs. In addition, the Law and Society Program offers 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, science, technology and society, and sociology. Students who wish to graduate with a concentration in law and society should consult the director of the program or one of the advisers listed above to plan a coherent program of study. Such a program should ordinarily include at least four courses from the following list. Other courses may be substituted with the approval of the adviser.

Anthropology 328 Law and Culture

Anthropology 329 Politics and Culture

Anthropology 627 Legal Anthropology

Classics 340 Ancient Greek Constitutions

Comparative Literature 326 Christianity and Judaism

[Economics 304 Economics and the Law Not offered 1984–85.]

Economics 354 Economics of Regulation

Government 313 The Nature, Functions, and Limits of Law

[Government 322 Criminal Justice Not offered 1984–85.]

Government 323 The "Fourth" Branch

Government 327 Civil Liberties in the United States

Government 328 Constitutional Politics: The United States Supreme Court

Government 353 The Feminist Movement and Public Policy

Government 364 Liberty, Equality, and the Social Order

Government 389 International Law

Government 414 The Administrative State

Government 428–429 Government and Public Policy: An Introduction to Analysis and Criticism

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 318 American Constitutional Development

History 359 The Early Development of Anglo-American Common Law

History 367 Church and State during the Middle Ages

[History 421 Constitutionalism as a Cultural Problem in America Not offered 1984–85.]

History 430 Law and Authority in American Life

Near Eastern Studies 252 Islamic Law and Society

Philosophy 342 Law, Society, and Morality (also Law 666)

[Philosophy 444 Contemporary Legal Theory (also Law 720) Not offered 1984–85]

Philsophy 446 Topics in Social and Political Philosophy

Sociology 207 Ideology and Social Concerns

Sociology 310 Sociology of War and Peace

Sociology 348 Sociology of Law

Sociology 427 The Professions: Organization and Control (also Industrial and Labor Relations 427)

Biology and Society 405 The Social Functions of Law and Medicine

Civil and Environmental Engineering 625 Environmental Law I

Civil and Environmental Engineering 627 Regulation of Toxic Substances

Consumer Economics and Housing 465 Consumers and the Law

Industrial and Labor Relations 607 Arbitration and Public Policy

Industrial and Labor Relations 680 Problems in Union Democracy

Medieval Studies

A. B. Groos, director; B. B. Adams, F. M. Ahl, 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. M. Messing, P. D. Molan, C. Moron-Arroyo, J. M. Najemy, D. S. Powers, D. M. Randel, B. Tierney, F. van Coetsem, W. Wetherbee

Undergraduates interested in medieval studies have an opportunity to take courses in the following areas of instruction: medieval Hebrew, Arabic, and Latin; Old English, Middle English, and 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); 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 Chretien 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.

103 Fantasy and Science Fiction, Medieval and Modern Fall or spring. 3 credits.
M W F 8. Staff.
We try to determine what fascinates the modern imagination about the Middle Ages and whether any continuum or connection exists between medieval and modern works. The course opens with a survey of medieval fantasy from varied cultures, e.g. *Grettier's Saga*, riddles, *The Voyage of Saint Brendan*, *Beowulf*, "The Dream of the Rood," Bernard Silvestris's *Cosmographia*, Marie de France's *Lais*, Chretien's romances of Arthur, *Mabinogion* tales, and Dante's *Inferno*. The second half of course examines the relationship of such works to modern science fiction and fantasy with a medieval setting or medieval views, such as J. R. R.Tolkien's *The Hobbit*, John Italo Calvino's *The Castle of Crossed Destinies*, Mark Twain's *A Connecticut Yankee*, and works by Ursula LeGuin and Poul Anderson. (We may also view Bergman's *The Seventh Seal*.)

Graduate Seminars

[601 Graduate Seminar Not offered 1984–85]

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, B. Faure, 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:

Asian Studies 351 Indian Buddhism Fall. 4 credits.
B. Faure

Asian Studies 355 Japanese Religions Fall. 4 credits.
B. Faure.

Asian Studies 357 Chinese Religions Fall. 4 credits.
B. Faure.

Asian Studies 371 Chinese Philosophical Literature Fall. 4 credits.
B. Faure.

Asian Studies 650 Topics in Asian Religion Spring. 4 credits.

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 421 Old Testament Seminar Fall. 4 credits.
C. Carmichael.

Comparative Literature 426 Biblical Law Spring. 4 credits.
C. Carmichael.

Comparative Literature 429 Readings in the New Testament Fall. 4 credits.
J. Bishop.

Comparative Literature 469 Mystics and Moralists of the Golden Age Fall. 4 credits.
C. M. Arroyo.

English 661 American Puritans Fall. 5 credits.
M. Colacurcio.

History 308 Reformation Europe 1450–1650 Fall. 4 credits.
R. Hsia.

History 365 Medieval Culture 400–1150 Fall. 4 credits.
J. John.

History 368 Francis of Assisi and the Franciscans Spring. 4 credits.
B. Tierney.

History 659 Seminar in Society and Religion in Early Modern Europe Fall. 4 credits.
R. Hsia.

Music 789 Liturgical Chant in the West Fall. 4 credits.
D. Randel.

Near Eastern Studies 151 Islamic Civilization Spring. 3 credits.
D. Powers.

Near Eastern Studies 221 Readings in Classical Hebrew Literature: The Art of Biblical Narrative Fall. 3 credits.
M. Collins.

Near Eastern Studies 222 Readings in Classical Hebrew Literature: The Art of Biblical Poetry Spring. 3 credits.
M. Collins

Near Eastern Studies 225 Judaic Literature in Late Antiquity: Dead Sea Scrolls and Sectarian Literature Spring. 3 credits.
M. Collins.

Near Eastern Studies 243 History and Archaeology of Ancient Israel Spring 4 credits.
D. Owen.

Near Eastern Studies 357 Islamic Law and Society Fall. 4 credits.
D. Powers.

Philosophy 215 Medieval Philosophy Spring. 4 credits.

Philosophy 263 Reason and Religion Fall. 4 credits.
N. Kretzmann.

Philosophy 412 Medieval Philosophy: Aquinas's Ethics Fall. 4 credits.
N. Kretzmann.

Russian and Soviet Studies Major

W. M. Pintner, chairman; 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, W. Kasack, S. Senderovich (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) Psychology 101 or 280 or Sociology 280; and (c) Sociology 301 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, philosophy of science or of social science, or advanced statistics (such as Sociology 424);
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. Jonathan Culler, director

Fellows for 1984-85: Wilfried Barner (University of Tubingen), Richard J. Becherer (University of Virginia), Laura Brown (Cornell University), Patricia Carden (Cornell University), Elena Ciletti (Hobart and William Smith Colleges), Michael Fend (Warburg Institute), Daniel Heartz (University of California at Berkeley), Theresa M. Kelley (University of Texas at San Antonio), Richard Lanham (University of California at Los Angeles), Lois Rosow (University of California at Los Angeles), John C. Shields (Illinois State University)

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 1984-85 year will be the classical tradition since the Renaissance.

Courses

101 Science as Literature: Science as *Metier*
Fall and spring. 3 credits. Freshman Seminar.
Fall: M W F 10:10. Spring: 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.

414 The Politics of Scholarship: Romanticism and Racialism in the Formation of Classics (also Government 345) Spring. 4 credits
W 1:25–3:10. M. Bernal.
The seminar will be on the formation of *Altertumswissenschaft,* or Classics, between 1770 and 1830. It will be concerned with social and political developments in northern Europe over the same period. Particular attention will be paid to the relationship between the rise of the new discipline and the simultaneous triumphs of romanticism and racialism.

415–416 The Ideology of Imperialism: The Augustan Age in Rome and England 415, fall; 416, spring. 4 credits each term. Students may enroll in either semester or in both.
W 1:25–3:10. L. Brown
This course will compare the literary cultures of two major imperialist eras: the first century B.C. and the first century A.D. in Rome and the Restoration and eighteenth century in England. We will address two central and related questions: First, what is the ideology of imperialism? Does it produce characteristic aesthetic contradictions? Does it have a specific and typical structure by which it can be defined? And second, does the literature written in an imperialist period contain characteristic formal traces of this ideology—in its choice of genre, its use of rhetoric, its imagistic patterns, its narrative or metaphorical structures? We will investigate the parallel ambivalences of Latin and English works in their representation of imperialist themes and issues, as well as the possible multiple valences—propagandist and progressive—of Augustan Rome for Augustan England. The reading will juxtapose a series of works by major English and Latin writers, moving from satirical dismissal of imperialism to celebrations of imperialist peace and prosperity—the *pax Romana* and the *pax Britannica*—to the critique of empire from a republican or anti-imperialist perspective.

418 Pedagogy and the Nineteenth-Century Novel Spring. 4 credits.
M 2:30–4:30, plus one hour to be arranged.
P. Carden.
Platonic thought affiliates basic philosophical questions to pedagogy. How do we know? How do we learn? What education will produce worthy citizens and rulers? Rousseau in his *Emile* took up the high philosophical tradition of pedagogy and recast it as a myth and as an incipient novel. In so doing he opened the way to what we can call the great pedagogical novels of the nineteenth century. In this seminar we will examine the principles of a pedagogy designed to encompass the whole of life as it is set forth in such works of Plato as *Meno, Phaedo, Symposium,* and *Republic* and as it is reintroduced into the mainstream of philosophical thought by Rousseau's *Emile* and Schiller's *Letters on Aesthetic Education.* Then we will turn to several novels of the nineteenth century, among them Tolstoy's *War and Peace,* Dostoevsky's *Notes from the Underground,* and Flaubert's *A Sentimental Education,* to see how the presumptions of a philosophical pedagogy rooted in Platonic thought were tested by authors who found in the novel a vehicle for philosophical and pedagogical myths or for their debunking.

420 Greek Myth in German Postwar Literature Spring. 4 credits.
W 3:35–5:20. W. Barner.
There is a remarkable fascination with Greek myth among German writers after World War II—some of them following prototypes such as Joyce, O'Neill, Sartre, and Anouilh but exploring their own original way. Interpretations of this "renaissance" are very controversial, often operating with labels like neoclassicism, traditionalism, escapism, and so on. It is worth reading the texts more precisely (in closer connection with the ancient models, too) and looking for the deeper motives. The seminar will mainly treat works by Bertolt Brecht, Friedrich Dürrenmatt, Heiner Müller, Karl Mickel, and Christa Wolf.

421 Rhetorical Analysis Fall. 4 credits
M 1:25–3:10. R. Lanham
The seminar will analyze examples of English prose, literary and nonliterary, from the Renaissance to the present. We consider the figures of classical rhetoric in detail and reflect upon the theory of ornament they imply. Time and participants' interest permitting, we do reading in other disciplines (social anthropology, behavioral biology, and postmodernist aesthetics, for example) where a similar theory of ornament has emerged. The seminar presupposes no literary training and welcomes participants from all disciplines; they need bring with them only examples of their own professional language for the seminar to analyze. The seminar aims to be of use both to literary critics and to teachers of prose composition.

422 Italian Serious Opera during the Eighteenth Century Spring. 4 credits.
R 2:30–4:30. D. Heartz.
Among the topics considered will be Metastasio and the Arcadian "reform" of the early eighteenth century, the ensuing "reform" typified by Gluck's *Orfeo ed Euridice,* which will be studied with a glance backwards towards the uses of the Orpheus myth when opera was first created ca. 1600, and the neoclassical synthesis achieved by Mozart's *Idomeneo.*

423–424 Napoleonic Town Planning 423, fall; 424, spring. 4 credits each term. Recommended: reading knowledge of French. Students may enroll in either semester or in both.
M 3:35–5.20. R. Becherer.
This seminar explores the shape of the Napoleonic city as index of Napoleon's social vision. It first concentrates on Napoleon's urbanistic ideas and their origins in the writings of Plato, Aristotle, Plutarch, and Alberti. It further addresses the forms of the city *per se*, focusing particularly on Paris and including other European centers that sought to imitate Napoleon's capital. It finally assesses lingering *idées napoleoniennes* within the social and urban theorizings of the nineteenth-century utopians and, particularly, of Louis-Napoleon Bonaparte.

425 Florentine Art and Culture in the Age of Galileo Fall. 4 credits.
R 3:35–5:20. E. Ciletti
A seminar dedicated to the proposition that the arts in Florence did not expire with the Renaissance but evolved into a vital variant of Italian baroque culture during the first half of the seventeenth century. Relevant themes include politics and artistic patronage at the Medici court, the influence of artists from Rome, the invention of opera, and the situation and impact of Galileo.

426 Florentine Art and the Twilight of the Medici Spring. 4 credits.
R 3:35–5:20. E. Ciletti.
A seminar about the unusual case of Florence around 1700, a city sinking into a fatal political decline accompanied by a dramatic flowering in the arts. The central issue is the surprisingly energetic artistic patronage of the Medici family during its last years of rule. We explore the artistic and political dimensions of this late Medici taste and its unique cultural frame.

427 Pastoral Speakers and Contexts Fall. 4 credits.
R 1:25–3:10. T. Kelley.
Some critics have argued that classical and Renaissance pastorals are concerned primarily with "Arcadian pastures," whereas romantic and postromantic pastorals emphasize "the ordinary landscapes of the modern world." This seminar will suggest another approach to defining pastoral. We ask whether the pastoral speaker, rather than a specifically Arcadian landscape, is a distinguishing feature of the genre. Using classical Latin and Greek texts as a point of departure, we explore how speakers in Renaissance pastoral address their subject and audience. What differences characterize this mode of address in nineteenth-century pastorals? What figure or figures recur in pastoral and why? Does pastoral exclude or entertain a historical consciousness? Is there a pastoral "speaker" in visual representations of pastoral subjects?

428 Allegory, Representation, and the Visual Arts Spring. 4 credits.
R 1:25–3:10. T. Kelley.
Beginning with a review of recent critical theory concerning allegory and representation, we explore changes in the conception of allegory since the Renaissance. We emphasize the Augustan rejection of Renaissance ideas concerning allegory and representation; the role of the "sister arts" tradition and history painting in the changing fortunes of allegory since the eighteenth century; and the romantic polemic against allegory and allied figures. Students may investigate the rhetorical figures most commonly present in allegory; the impulses that appear to distinguish allegory from other narrative and symbolic modes; or the role of the reader in an allegorical structure of meaning. Although we focus on nineteenth- and twentieth-century materials, opening sessions will consider Spenser and allegory.

429 The Interaction of Classical and Nonclassical Elements in the Tragédie-Lyrique Fall. 4 credits.
M 2:30–4:25. L. Rosow.
The *tragedie-lyrique* was a hybrid art form, combining characteristics of various genres, especially the *pastorale,* French neoclassical tragedy, Venetian opera, and French court ballet. The seminar will focus on the *tragedie-lyrique* from Lully to Rameau but will examine works in a number of other genres in the process; it will also explore contemporaneous attitudes toward the compromise between classical ideals and other values in seventeenth- and eighteenth-century French opera. Students in all fields are welcome; no specialized knowledge of music is required.

430 French Operatic Recitative from Lully to Rameau Spring. 4 credits.
M 2:30–4:25. L. Rosow.
The first few weeks of the term will be devoted to an introduction to seventeenth- and eighteenth-century French opera; stylistic and source-critical issues will be considered. The seminar will then concentrate on recitative, especially on the interpretation of its fluctuating meters.

431 Classicism in Early American Poetry: Adam and Aeneas (1516–1750) Fall. 4 credits
T 3:35–5:20. J. Shields.
Most literate early Americans were as familiar with Roman and Greek authors as they were with biblical Hebrew and Christian ones. The curriculum at Harvard, for example, included courses in Greek drama and philosophy, as well as others in the classical epic. It will be the objective of this course to investigage the far-reaching influence of classical culture and literature on the evolving ideas that helped to define colonial American literature and culture before 1750, as especially manifested by the

poetry of this early period. Whereas the gift of the Adamic myth was largely spiritual and theocratic, the myth of Aeneas (here used to represent classical culture in general) suggested to early American writers and thinkers a political, social, and cultural ideology that was tinctured with a secular spirituality wholly compatible with deism and the Age of Reason.

432 Classicism in Early American Poetry: Adam Becomes Aeneas (1750–1800) Spring. 4 credits
T 3:35–5:20. J. Shields.
We explore how internalization of the myth of Aeneas supplanted (but did not, of course, fully replace) the Adamic myth in the minds of literate, thinking early Americans. Observations to be developed include: that early American poets constructed their own version of the pastoral elegy (not doing obeisance to Milton's "Lycidas" but following Vergil's eclogue on Daphnis); that such poets as Dwight, Barlow, and Wheatley experimented with epic form, Wheatley in particular manifesting a decidedly secular move; that these experiments with classical genres reflect a surge toward literary independence preceding and perhaps even providing, the impetus for political independence; that poets (Wheatley and Freneau, for example) of the American Revolution spoke of the new nation as "New Rome"; and, finally, that the Roman virtue of *pietas* (devotion to the gods, to family and to country) manifested by Vergil's Aeneas actually becomes "the American Way": love of God, mother, and country.

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.

437 Orpheus: A Story of a Hero Fall. 4 credits.
T 1:25–3:10. M. Fend.
Since the Renaissance the mythical figure of Orpheus has been treated in various ways: as a theological writer, as a singer, and as a civilizer of bestial nature. We shall deal with musical, philosophical, and pictorial presentations of the myth, focused on three points in history: around the years 1600, 1800, and 1920. While the myth was especially popular in its most literal form in seventeenth-century operas, it became more complex in the following centuries as writers distanced themselves from their classical sources and no longer depicted the underworld and its god, Pluto, in a concrete form. In twentieth-century versions the power of music is no longer the keystone of the story. The disappearance of Euridyce triggers Orpheus's loss of self-confidence and his grip on reality.

438 The Controversy Regarding the Pythagorean Concept of Consonance in the Early Seventeenth Century Spring. 4 credits.
T 1:25–3:10. M. Fend.
The scientific experiment on sound and interval by Benedetti, V. Galilei, and Mersenne demonstrated that the Pythagorean concept of musical consonances, which was based on the monochord and on a legend about the invention of harmonic proportions in a blacksmith's forge, was acoustically wrong. The crisis of the Pythagorean concept gave rise to various forms of response, which will be studied in the works by Fludd, Kepler, Descartes, and Mersenne.

South Asia Program

B. G. MacDougall, director; J. L. Compton, E. W. Coward, E. Erickson, J. W. Gair, D. Holmberg, J Jasnoff, M. Katzenstein, V. Kayastha, G. B. Kelley, K. A. R. Kennedy, B. Lust, R. MacDougall, K. March, G. Messing, S. O'Connor, P. Olpadwala, T. Poleman, M. Potts, D. Sisler, N. Uphoff

The South Asia Program coordinates research, teaching, and special campus events for Bangladesh, India, Pakistan, Nepal, and Sri Lanka. The program faculty includes members from a variety of disciplines, including agricultural economics, anthropology, architecture, art, government, linguistics, planning, and rural sociology. Undergraduates with a special interest in the region may major in Asian studies with a South Asian concentration. The languages regularly offered are Hindi, Sinhala, Tamil, Telugu, Urdu, Sanskrit, and Pali. Nepali is offered on demand. Cornell is a class A member of the American Institute of Indian Studies (AIIS), and undergraduates as well as graduate students are eligible for AIIS language program fellowships in India. For courses available in South Asian studies and details on the major, see the Department of Asian Studies listing in this volume. Student wishing further information on courses and research opportunities should direct questions to the program office, 166 Uris Hall.

Southeast Asia Program

B. R. Anderson, director; R. Barker, M. L. Barnett, J. A. Boon, Jr., T. Chaloemtiarana, E. W. Coward, M. F. Hatch, C. Hirschman, F. E. Huffman, R. B. Jones, Jr., G. McT. Kahin, A. T. Kirsch, R. T. McVey, S. J. O'Connor, 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, for which National Resource Fellowships are available. 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; J. Allen, D. Barr, F. Berger, J. Blackall, R. Boyd, K. Brazell, L. Brown, J. Brumberg, S. Buck-Morss, J. Condry, A. Cook, W. Cross, R. Cypess, I. Ezergailis, J. Farley, L. Fitzgerald, J. Ford, 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, P. Moen, C. Mohanty, M. B. Norton, E. Regan, N. Salvatore, S. Siegel, E. Vatter, L. Waugh. Staff and community members: L. Abel, K. Allen, R. Dickinson, Z. Eisentein, J. Harris, H. Johnson, N. Kazmierski, L. Lavine, J. T. McHugh, N. Meltzer, K. Pelton, M. Rivchin, A. Russ, R. Siegel, I. Zahava. Student members: H. Bittker, J. Durkin, E. Gutrecht, S. Laird, D. Devine, E. Polakoff, H. Silverberg, M. Totin, G. Weix

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/study group 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: (a) any two of 238, 244, 277, 321, 353, 355, 422, or (b) any one of 110, 362, 493, plus one from list a.
History: any two of 227, 238, 326, 363.
Humanities: (a) any two of 248, 249, 251, 348, 399, 451, 453, 456, 467, 476, or (b) any of 110, 362, 493, plus one from list a.

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 1984–85.
B deBary]

[105 Feminine and Masculine Ideals in Japanese Culture (also Asian Studies 105) Fall. 3 credits. Not offered 1984–85.
M W F 12:20. K. Brazell.]

106 Women and Writing (also English 105) Fall and spring. 3 credits.
Hours to be arranged. Staff
What is a woman? How does she confront her personal experience? Does she play a special role in history, in our definition of society, or in our understanding of language and literature? This course will explore the 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 1984–85.
M. B. Norton.]

II. General Courses

110 Introduction to Women's Studies Fall. 3 credits. Limited to 18 students.
M W F 10:10. 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. This course introduces students to the critical analyses of Western culture developed in the context of the feminist movement. We will focus on the socioeconomic, sexual, and racial dynamics of our own culture and their effects 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, and poverty, and 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 capabilties) 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) Spring. 4 credits. Limited to 20 students. Intended primarily for sophomores.
M 2:30–4:25. M. B. Norton.
A reading and discussion course. The class will begin by examining sex roles in the United States in the 1980s, looking at a variety of sources like popular magazines and contemporary commentaries. We will then move backwards in time in an attempt to uncover the roots of current attitudes. The students will help to determine which topics the class will investigate in detail.

230 Feminist Theory and the Challenge of Third World Feminisms Spring. 4 credits.
T R 10:10. C. Mohanty.
This course is designed to explore the major issues in feminist theory vis-a-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 foucs 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.

[244 Language and the Sexes (also Linguistics 244) Spring. 4 credits. Not offered 1984–85.
S. McConnell-Ginet.]

[249 Feminist Issues in Nineteenth- and Twentieth-Century Literature (also English 248) Spring. 4 credits. Not offered 1984–85.
M. Jacobus]

277 Psychology of Sex Roles (also Psychology 277 and Sociology 277) Spring. 3 or 4 credits. Prerequisite: an introductory psychology course.
T R 2:30–4. S. Bem.
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 childrearing, female sexuality, homosexuality, and transsexualism.

[321 Sex and Gender in Cross-Cultural Perspective (also Anthropology 321) Fall. 4 credits Not offered 1984–85; next offered 1985–86.
M W F 2:30. K. S. March]

[326 Women in the American Society, Past and Present (also History 326) Fall. 4 credits. Not offered 1984–85.
T R 9:05. M. B. Norton]

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 and shape, as well as to counter social change. In examining the law and public policy on such issues as job discrimination, wife battery, rape, abortion, etc., the course explores the contradictions between and the congruence of the dual ideals of individual choice and group equality.

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) Spring. 3 credits. Students in endowed units must register for Women's Studies or Sociology 238.
T R 2:30–4. Staff.
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. 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 1984 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, two twentieth-century works, Jean Rhys's *Wide Sargasso Sea* and Edith Wharton's *Ethan Frome,* will be approached as imaginative sequels to *Jane Eyre* and *Wuthering Heights,* respectively.

[251 Twentieth-Century Women Novelists (also English 251) Fall. 4 credits. Not offered 1984–85.
M W F 1:25. M. Hite.]

338 Rusian Feminism Spring. 3 credits.
T R 12:20–1:45. L. Engelstein.
Feminism and nineteenth-century political movements; the feminist role in the revolutions of 1905 and 1917; the woman question in the 1920s. Can feminism be a viable political force in a country without a liberal tradition?

[348 The Female Literary Traditon: Wollstonecraft to Woolf (also English 348) Spring. 4 credits. Not offered 1984–85.
M W F 12:20. M. Jacobus]

[363 Women in Classical Greece and Rome (also Classics 363) Spring. 4 credits. Not offered 1984–85.
L. Abel]

365 Directions in Feminist Theory (also Government 362) Spring. 4 credits.
T R 10:10. 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.

372 Sex Discrimination: Law and Social Policy (also Sociology 372) Fall. 3 credits.
Hours to be arranged. C. Bohmer.
This course will cover the current legal and social trends in the area of sex discrimination. The relationship between feminist consciousness and organization and developments in gender-related constitutional law and legislation will be examined. Focusing on such topics as education, employment, gay rights, and reproductive control, the course will analyze the relationship between legal change and sociopolitical change as it affects equal rights.

399 Forms of Opposition: German Women Writers on the Nazi Period (also German Literature 399 and Comparative Literature 399) Spring. 4 credits.
T R 12:20. C. A. Martin.
A study of women's writing on the Nazi period, with an emphasis on the impact of divergent developments in the two postwar German states on historical memory. This course will pay particular attention to the choices and effects of different literary forms and languages. Readings will include, but not be limited to, texts by Anna Seghers, Elisabeth Langgässer, Luise Rinser, and Christa Wolf.

[422 Special Problems in the Anthropology of Sex and Gender (also Anthropology 422 and Biology and Society 406) Fall. 4 credits. Not offered 1984–85.
K. S. March.]

428 Spirit Possession, Shamanism, Curing, and Witchcraft (also Anthropology 428) Spring. 4 credits.
Hours to be arranged. D. Holmberg.
An anthropological consideration of witchcraft, shamanisms, and cults of spirit possession, with special attention to the play of gender. Classic anthropological accounts of non-Western societies will be considered along with ethnographic and historical accounts of Western societies. The course also addresses general problems in the study of women and gender and the anthropology of myth, ritual, and symbolism.

[453 Victorians and Modernists: Literary Legends from Wilde to Woolf (also English 453) Spring. 4 credits. Not offered 1984–85.
M 2:30-4:30, plus one hour to be arranged.
S. Siegel]

[456 Edith Wharton, Willa Cather, and Eudora Welty (also English 456) 4 credits. Not offered 1984–85; next offered fall 1985.
T R 2:30-3:45. J. F. Blackall]

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. Not offered 1984–85.
T R 10:10. D. Mermin.]

[478 Women and Writing (also English 478) Fall. 4 credits. Not offered 1984–85.
M. Jacobus.]

[479 On Reading Women Poets (also English 479) Spring. 4 credits. Not offered 1984–85.
S. Siegel]

493 French Feminisms (also French 493) Fall. 4 credits.
T R 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. Not offered 1984–85.
T 2:30–4:30. M. B. Norton.]

[627 Graduate Seminar in the History of American Women Spring. 4 credits. Not offered 1984–85.
M. B. Norton.]

[638 Contemporary German Women Writers (also German Literature 638) Fall. 4 credits. Not offered 1984–85.
R 3:35–5:35. I. Ezergailis.]

[685 Seminar in Sex Differences and Sex Roles (also Psychology 685 and Sociology 685) Fall 4 credits. Prerequsite: permission of instructor. Not offered 1984–85.
S. Bem.]

IV. Related Courses and Seminars

[305 Psychological Anthropology (also Anthropology 305) Fall. 4 credits. Not offered 1984–85.
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 1984–85.
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 10:10–11:40. Staff.
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. Not offered 1984–85.
Hours to be arranged. S. Buck-Morss.]

[463 The Repressed Feminine in the Writings of Marx (also Government 466) Fall. 4 credits. Not offered 1984–85.
S. Buck-Morss.]

467 Current Topics in Political Philosophy (also Government 467) Fall. 4 credits.
T 12:20–2:20. 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.

[671 Readings in Contemporary Social Theory (also Govenment 670) Spring. 4 credits Not offered 1984–85.
Hours to be arranged. S. Buck-Morss.]

[759 Virginia Woolf (also English 759) Fall 5 credits. Prerequisite: permission of instructor Not offered 1984–85.
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.
E. Kain.

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
Abruña, 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/Comparative Literature
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. Assoc. 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
Bereaud, 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
Bernstock, Judith, Ph.D., Columbia U. Asst. Prof., History of Art
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
Blackall, Jean F., Ph.D., Harvard U. Prof., English
Blumin, Stuart M., Ph D., U. of Pennsylvania. Assoc. Prof., History
Bogel, Fredric V., Ph.D., Yale U. Prof., English
Boon, James A., Ph.D., U. of Chicago. Prof., Anthropology/Comparative Literature
Bowers, John S., Ph.D., Massachusetts Inst. of Technology. Prof., Modern Languages and Linguistics
Boyd, Richard N., Ph.D., Massachusetts Inst. of Technology. Prof., Philosophy
Bramble, James H., Ph.D., U. of Maryland. Prof., Mathematics
Brazell, Karen W., Ph.D., Columbia U. Prof., Japanese Literature (Asian Studies)
Breiger, Ronald L., Ph.D., Harvard U. Prof., Sociology
Briggs, Herbert W., Ph.D., Johns Hopkins U. Goldwin Smith Professor of International Law Emeritus, Government
Bronfenbrenner, Urie, Ph.D.; U. of Michigan, Jacob Gould Schurman Professor, Human Ecology/Psychology
Brown, Kenneth S., Ph.D., Massachusetts Inst. of Technology. Prof., Mathematics
Brown, Laura, Ph.D., U. of California at Berkeley. Assoc. Prof., English
Brown, Lawrence D., Ph.D., Cornell U. Prof., Mathematics
Brown, Stuart M., Jr., Ph.D., Cornell U. Prof. Emeritus, Philosophy/Science, Technology, and Society
Brown, Theodore M., Ph.D., U. of Utrecht (Netherlands). Prof., History of Art
Browne, E. Wayles III, Ph.D., U. of Zagreb (Yugoslavia). Assoc. Prof., Modern Languages and Linguistics
Brumberg, Joan Jacobs, Ph.D., U. of Virginia. Asst. Prof., Human Ecology/Women's Studies
Buck-Morss, Susan F., Ph.D., Georgetown U. Assoc. Prof., Government
Burdett, Kenneth, Ph D., Northwestern U. Assoc. Prof., Economics
Burlitch, James M., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Chemistry
Caldwell, Steven B., Ph.D., Cornell U. Assoc. Prof., Sociology
Calkins, Robert G., Ph.D., Harvard U. Prof., History of Art
Campbell, Donald B., Ph.D., Cornell U.. Prof., Astronomy/NAIC‡
Caputi, Anthony F., Ph.D., Cornell U. Prof., English/Comparative Literature
Carden, Patricia J., Ph.D., Columbia U. Prof., Russian Literature
Carmichael, Calum M., B. Litt., Oxford U. (England). Prof., Comparative Literature/Biblical Studies
Carpenter, Barry K., Ph D., U. College, London (England). Assoc. Prof., Chemistry
Cassel, David G., Ph.D., Princeton U. Prof., Physics/LNS¶
Chase, Cynthia, Ph.D., Yale U. Asst. Prof., English
Chase, Stephen U., Ph.D., U. of Chicago. Prof., Mathematics
Chester, Geoffrey V., Ph.D., King's Coll., London (England). Prof., Physics/LASSP*
Chirinko, Robert, Ph D., Northwestern U. Asst. Prof., Economics
Clardy, Jon C., Ph.D., Harvard U. Prof., Chemistry
Clark, M. Gardner, Ph.D., Harvard U. Prof., Industrial and Labor Relations/Economics
Clements, George, Ph D., U. of London (England). Assoc. Prof., Modern Languages and Linguistics
Clinton, Kevin M., Ph.D., Johns Hopkins U. Prof., Classics
Cochran, Sherman G., Ph.D., Yale U. Assoc. Prof., History
Cohen, Marshall M., Ph.D., U. of Michigan. Prof., Mathematics
Cohen, Walter I., Ph D., U. of California at Berkeley. Asst. Prof., Comparative Literature
Colacurcio, Michael J., Jr., Ph.D., U. of Illinois. Prof., English
Colby-Hall, Alice M., Ph.D., Columbia U. Prof., Romance Studies
Cole, Holly, M.F.A., Carnegie-Mellon U. Asst. Prof., Theatre Arts
Cole, Stephen R., B.A., U. of Indiana. Assoc. Prof., Theatre Arts
Coleman, John E., Ph.D., U. of Cincinnati. Prof., Classics
Collins, Marilyn F., Ph.D., Yale U. Asst. Prof., Near Eastern Studies
Collum, David B., Ph.D., Columbia U. Asst. Prof., Chemistry
Connelly, Robert, Ph.D., U. of Michigan. Assoc. Prof., Mathematics
Cook, Margaret, Ph.D., U. of Washington. Asst. Prof. Classics
Cooke, W. Donald, Ph.D., U. of Pennsylvania. Prof., Chemistry
Cooper, Barbara H., Ph.D., California Inst. of Technology, Asst. Prof., Physics/LASSP*
Cordes, James M., Ph.D., U. of California at San Diego. Asst. Prof., Astronomy/NAIC‡
Corson, Dale R., Ph.D., U. of California at Berkeley. Prof. Emeritus, Physics
Cotts, Robert M., Ph.D., U. of California at Berkeley. Prof., Physics/LASSP*
Culler, Jonathon D., D. of Phil., Oxford U. (England). Class of 1916 Professor, English/Comparative Literature
Cutting, James E., Ph.D., Yale U. Assoc. Prof., Psychology
Dannhauser, Werner J., Ph D., U. of Chicago. Prof., Government
Darlington, Richard B., Ph.D., U. of Minnesota. Prof., Psychology
Davis, Tom E., Ph.D., Johns Hopkins U. Prof., Economics
deBary, Brett, Ph.D., Harvard U. Assoc. Prof., Japanese Literature (Asian Studies)
Deinert, Herbert, Ph.D., Yale U. Prof., German Literature
Dennis, Roger K., Ph.D., Rice U. Prof., Mathematics
DeVoogd, Timothy J., Ph.D., U. of Illinois. Asst. Prof., Psychology
DeWire, John W., Jr., Ph D., Ohio State U. Prof., Physics/LNS¶
Dotson, Arch T., Ph.D., Harvard U. Prof., Government
Dotson, Esther G., Ph.D., New York U. Assoc. Prof., History of Art
Drake, Frank D., Ph.D., Harvard U. Goldwin Smith Professor of Astronomy, Astronomy/NAIC‡
Dressler, Ralph, M.F.A., Brandeis U. Asst. Prof., Theatre Arts
Dynkin, Eugene B., Dr. of Sci., Moscow U. (USSR). Prof., Mathematics
Dyson-Hudson, V. Rada, D. Phil., Oxford U. (England). Assoc Prof., Anthropology
Earle, Clifford J., Ph.D., Harvard U. Prof., Mathematics
Easley, David, Ph.D., Northwestern U. Assoc. Prof., Economics
Ebrill, Liam P., Ph D., Harvard U. Assoc. Prof., Economics
Eddy, Donald D., Ph.D., U. of Chicago. Prof., English/University Libraries
Edmonston, Barry, Ph.D., U. of Michigan. Assoc. Prof., Sociology
Ehrenberg, Ronald, Ph D., Northwestern U. Prof., Industrial and Labor Relations/Economics
Einaudi, Mario, Ph.D., U. of Turin (Italy). Goldwin Smith Professor of Government Emeritus, Government
Elledge, Scott B., Ph.D., Cornell U. Goldwin Smith Professor of English Literature Emeritus, English
Emerson, Caryl G., Ph.D., U. of Texas at Austin. Asst. Prof., Russian Literature
Esman, Milton J., Ph.D., Princeton U. Prof., Government
Ezergailis, Inta M., Ph.D., Cornell U. Prof., German Literature
Ezra, Gregory S., Ph.D., Oxford U. Asst. Prof., Chemistry
Farrell, Robert T., Ph.D., Fordham U. Prof., English/Medieval Studies/ Archaeology
Farell, Roger H., Ph.D., U. of Illinois. Prof., Mathematics
Faure, Bernard, D.E.S., Institut des Langues et Civilisations Orientales (France). Asst. Prof., Asian Religions (Asian Studies)
Fay, Robert C., Ph.D., U. of Illinois. Prof., Chemistry
Feigenbaum, Mitchell J., Ph.D., Massachusetts Inst. of Technology. Prof. Physics/LASSP*
Fine, Gail J., Ph.D., Harvard U. Assoc. Prof., Philosophy
Finlay, Barbara L., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Psychology
Fisher, Michael E., Ph.D., Kings Coll., London (England). Horace White Professor of Chemistry, Physics, and Mathematics, Chemistry/Physics/LASSP*
Fitchen, Douglas B., Ph.D., U. of Illinois. Prof., Physics/LASSP*
Fitzgerald, Lorna K., Ph.D., Princeton U. Asst. Prof., Psychology
Fogel, Ephim G., Ph.D., Ohio State U. Prof., English
Fortune, Joanne E., Ph.D., Cornell U. Asst. Prof., Physiology/Women's Studies
Franck, Carl P., Ph.D., Princeton U. Asst. Prof., Physics/LASSP*
Frank, Robert H., Ph.D., U. of California at Berkeley. Assoc. Prof., Economics
Fredericksen, Donald L., Ph.D., U. of Iowa. Assoc. Prof., Theatre Arts

Freed, Jack H., Ph.D., Columbia U. Prof., Chemistry
Freyd, Jennifer J., Ph.D., Stanford U. Asst. Prof., Psychology
Fried, Debra, Ph.D., Yale U. Asst. Prof., English
Fuchs, Wolfgang H., Ph.D., Cambridge U. Prof., Mathematics
Furman, Nelly, Ph.D., Columbia U. Assoc. Prof., Romance Studies
Gair, James W., Ph.D., Cornell U. Prof., Modern Languages and Linguistics
Galenson, Walter, Ph.D., Columbia U. Jacob Gould Schurman Professor of Economics, Economics/Industrial and Labor Relations
Galik, Richard S., Ph.D., Cornell U. Asst. Prof., Physics/LNS¶
Ganem, Bruce, Ph.D., Columbia U. Prof., Chemistry
Gelbart, Stephen S., Ph D., Princeton U. Prof., Mathematics
Gibian, George, Ph.D., Harvard U. Goldwin Smith Professsor of Russian and Comparative Literature, Russian Literature
Gibson, Eleanor J., Ph.D., Yale U. Susan Linn Sage Professor of Psychology Emeritus, Psychology
Gierasch, Peter J., Ph.D., Harvard U. Prof., Astronomy/CRSR†
Gilchriese, Murdock G. D., Ph D., Stanford U. Assoc. Prof., Physics/LNS¶
Gilman, Sander L., Ph.D., Tulane U. Prof., German Literature and Humane Studies/Prof., Near Eastern Studies/Prof., Psychiatry (History), Cornell Medical College
Gilovich, Thomas, Ph.D., Stanford U. Asst. Prof., Psychology
Ginet, Carl A., Ph.D., Cornell U. Prof., Philosophy
Ginsberg, Benjamin, Ph D., U of Chicago. Prof., Government
Ginsburg, Judith R., Ph.D., U. of California at Berkeley. Assoc. Prof., Classics
Gittelman, Bernard, Ph.D., Massachusetts Inst. of Technology. Prof., Physics/LNS¶
Golay, Frank H., Ph.D., U. of Chicago. Prof. Emeritus, Economics
Gold, Thomas, Ph.D., Cambridge U. (England). John L. Wetherill Professor of Astronomy, Astronomy/CRSR†
Goldfield, Michael, Ph.D., U. of Chicago. Asst. Prof., Government
Goldsen, Rose K., Ph.D., Yale U. Prof., Sociology
Goldstein, Melvin J., Ph.D , Yale U. Prof., Chemistry
Gottfried, Kurt, Ph D., Massachusetts Inst. of Technology. Prof., Physics/LNS¶
Grant, Edward R., Ph.D., U. of California at Davis. Assoc. Prof., Chemistry
Green, Leonard, Ph.D., Cornell U. Asst. Prof., English
Greenhouse, Carol J., Ph.D., Harvard U. Assoc. Prof., Anthropology
Greenwood, Davydd J., Ph.D., U. of Pittsburgh. John S. Knight Professor, Anthropology/Science, Technology, and Society
Gregory, Stephen, Ph D., U. of Waterloo. Asst. Prof., Physics/LASSP*
Greisen, Kenneth I., Ph.D., Cornell U. Prof. Emeritus, Physics
Grimes, Joseph E., Ph.D., Cornell U. Prof., Modern Languages and Linguistics
Groos, Arthur B., Jr., Ph.D., Cornell U. Prof., German Literature
Gross, Leonard, Ph.D., U. of Chicago. Prof., Mathematics
Gross, Robert F., Ph.D., U. of North Carolina at Chapel Hill. Asst. Prof., Theatre Arts
Grossvogel, Anita V., Ph D., Cornell U. Assoc. Prof., Romance Studies
Grossvogel, David I., Ph.D., Columbia U. Goldwin Smith Professor of Comparative Literature and Romance Studies, Romance Studies
Grout, Donald J., Ph.D., Harvard U. Prof. Emeritus, Music
Gunn, Edward M., Jr., Ph.D., Columbia U. Assoc. Prof., Chinese Literature (Asian Studies)
Hagfors, Tor, Ph.D., U. of Oslo (Norway). Prof., Astronomy/Engineering/NAIC‡
Halpern, Bruce P., Ph.D., Brown U. Prof., Psychology/Biological Sciences
Hamilton, Richard S., Ph.D., Princeton U. Prof., Mathematics
Hammes, Gordon G., Ph.D., U. of Wisconsin. Horace White Professor of Chemistry and Biochemistry, Chemistry/Biological Sciences
Hand, Louis N., Ph.D., Stanford U. Prof., Physics/LNS¶
Hannan, Michael T., Ph.D., U. of North Carolina. Prof., Sociology
Harbert, Wayne E., Ph.D., U. of Illinois. Assoc. Prof., Modern Languages and Linguistics
Harris, Joseph C., Ph.D., Harvard U. Prof., English and Old Icelandic, English
Hartill, Donald L., Ph.D., California Inst. of Technology. Prof., Physics/LNS¶
Hartman, Paul L., Ph.D., Cornell U. Prof. Emeritus, Physics/Applied and Engineering Physics/LASSP*
Harwit, Martin O., Ph.D., Massachusetts Inst. of Technology. Prof., Astronomy/CRSR†
Hatch, Martin, Ph.D., Cornell U. Asst. Prof., Music
Hatcher, Allen, Ph.D., Stanford U. Prof., Mathematics
Hay, George A., Ph.D., Northwestern U. Prof., Economics/Law
Hayes, Donald P., Ph.D., U. of Washington. Prof., Sociology
Haynes, Martha P., Ph.D., Indiana U. Asst. Prof., Astronomy/NAIC‡
Hays, Michael D., Ph.D., U. of Minnesota. Assoc. Prof., Theatre Arts
Henderson, David W., Ph D., U. of Wisconsin. Prof., Mathematics
Henderson, John S., Ph.D., Yale U. Assoc. Prof., Anthropology
Herrin, W. Lamar, Ph.D., U. of Cincinnati. Assoc., Prof., English
Hildebrand, George H., Ph.D., Cornell U. Maxwell M. Upson Professor of Economics and Industrial Relations Emeritus, Economics/Industrial and Labor Relations
Hill, Thomas D., Ph D., Cornell U. Prof., English and Medieval Studies
Hirschman, Charles, Ph.D., U. of Wisconsin. Prof., Sociology
Hite, Molly, Ph.D., U. of Washington. Asst. Prof., English
Ho, Wilson, Ph.D., U. of Pennsylvania. Asst. Prof., Physics/LASSP*
Hockett, Charles F., Ph.D., Yale U. Goldwin Smith Professor Emeritus, Modern Languages and Linguistics/Anthropolgy
Hodes, Harold, Ph.D., Harvard U. Asst. Prof., Philosophy
Hoffmann, Roald, Ph.D., Harvard U. John A. Newman Professor of Physical Science, Chemistry
Hohendahl, Peter U., Ph.D., Hamburg U. (Germany). Prof., German Literature/Comparative Literature
Holcomb, Donald F., Ph.D., U. of Illinois. Prof., Physics/LASSP*
Holdheim, W. Wolfgang, Ph D., Yale U. Frederic J. Whiton Professor of Liberal Studies, Comparative Literature/Romance Studies
Holloway, Thomas H., Ph.D., U. of Wisconsin. Assoc. Prof., History
Holmberg, David H., Ph.D., Cornell U. Asst. Prof., Anthropology/Women's Studies
Holmes, Clive A., Ph.D., Cambridge U. (England). Prof., History
Houck, James R., Ph D., Cornell U. Prof., Astronomy/CRSR†
Houston, Paul L., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Chemistry
Hsia, Ronnie Po-chia, Ph.D., Yale U. Asst. Prof., History
Hsu, John T. H., D.Music, New England Conservatory of Music. Old Dominion Foundation Professor of Humanities and Music, Music
Hubbard, John H., Doctorat d'Etat U. de Paris (France). Prof., Mathematics
Huffman, Franklin E., Ph.D., Cornell U. Prof., Modern Languages and Linguistics
Hull, Isabel V., Ph.D., Yale U. Assoc. Prof., History
Husa, Karel, Diploma, Conservatory in Paris (France). Kappa Alpha Professor of Music, Music
Hwang, Jiunn, Ph D., Purdue U. Asst. Prof., Mathematics
Irwin, Terance H., Ph.D., Princeton U. Prof., Philosophy
Isard, Walter, Ph.D., Harvard U. Prof., Economics
Isbell, Billie J., Ph.D., U. of Illinois, Assoc. Prof., Anthropology
Jacobus, Mary L., D. Phil., Oxford U. (England). Prof., English/Women's Studies
Janowitz, Phyllis, M.F.A., U. of Massachusetts. Asst. Prof., English
Jasanoff, Jay H., Ph.D., Harvard U. Prof., Modern Languages and Linguistics
John, James J., Ph.D., U. of Notre Dame. Professor of Paleography and Medieval History, History
Johnston, Robert E., Ph.D., Rockefeller U. Assoc. Prof., Psychology
Jones, Robert B., Jr., Ph.D., U. of California at Berkeley. Prof., Modern Languages and Linguistics
Jordan, Teresa E., Ph.D., Stanford U. Asst. Prof., Geological Sciences
Jorden, Eleanor H., Ph.D., Yale U. Mary Donlon Alger Professor of Linguistics, Modern Languages and Linguistics
Kahin, George McT., Ph.D., Johns Hopkins U. Aaron L. Binenkorb Professor of International Studies, Government
Kahl, Joseph A., Ph.D., Harvard U. Prof. Emeritus, Sociology
Kahn, Alfred E., Ph.D., Yale U. Robert Julius Thorne Professor of Political Economy, Economics
Kahn, H. Peter, M.A., New York U. Prof. Emeritus, History of Art
Kahn, Peter J., Ph.D., Princeton U. Prof., Mathematics
Kammen, Michael G., Ph.D., Harvard U. Newton C. Farr Professor of American History and Culture, History
Kaplan, Steven L., Ph.D., Yale U. Prof., History
Kaske, Carol V., Ph.D., Johns Hopkins U. Asst. Prof., English
Kaske, Robert E., Ph.D., U. of North Carolina. Avalon Foundation Professor in the Humanities, English
Katz, Steven T., Ph.D., Cambridge U. (England). Prof., Near Eastern Studies
Katzenstein, Mary F., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Government
Katzenstein, Peter J., Ph.D., Harvard U. Prof., Government
Keil, Frank C., Ph D., U. of Pennsylvania. Assoc Prof., Psychology
Kelley, E. Wood, Ph D., Indiana U. Assoc. Prof., Government
Kelley, Gerald B., Ph.D., U. of Wisconsin. Prof., Modern Languages and Linguistics
Kennedy, William J., Ph.D., Yale U. Prof., Comparative Literature
Kenworthy, Eldon G., Ph.D., Yale U. Assoc. Prof., Government
Kesten, Harry, Ph.D., Cornell U. Prof., Mathematics
Kiefer, Nicholas M., Ph D., Princeton U. Assoc. Prof., Economics
King, Ronald F., Ph.D., U. of Chicago. Asst. Prof., Government
Kinoshita, Toichiro, Ph.D., Tokyo U. (Japan). Prof., Physics/LNS¶
Kirkwood, Gordon M., Ph D., Johns Hopkins U. Frederick J. Whiton Professor of Classics Emeritus, Classics
Kirsch, A. Thomas, Ph.D., Harvard U. Prof., Anthropology
Kirschten, Robert W., Ph D., U. of Chicago. Asst. Prof. English
Klein, Richard J., Ph.D., Yale U. Assoc. Prof., Romance Studies
Knapp, Anthony W., Ph.D., Princeton U. Prof., Mathematics
Koschmann, J. Victor, Ph D., U. of Chicago. Asst. Prof., History
Kramnick, Isaac, Ph.D., Harvard U. Richard J. Schwarz Professor of Government, Government
Kretzmann, Norman, Ph D., Johns Hopkins U. Susan Linn Sage Professor of Philosophy, Philosophy
Krevans, Nita, Ph.D., Princeton U. Asst. Prof., Classics
Kronfeld, Chana, Ph D., U. of California at Berkeley. Asst. Prof., Near Eastern Studies

Kronik, John W., Ph D., U. of Wisconsin. Prof., Romance Studies
Krumhansl, Carol L., Ph D., Stanford U. Assoc. Prof., Psychology
Krumhansl, James A., Ph.D., Cornell U. Horace White Professor of Physics, Physics/LASSP*
Kufner, Herbert L., Ph D., Cornell U. Prof., Modern Languages and Linguistics
LaCapra, Dominick C., Ph.D., Harvard U. Prof., History
LaFeber, Walter F., Ph.D., U. of Wisconsin. Marie Underhill Noll Professor of American History, History
Lambert, Bernd, Ph.D., U. of California at Berkeley. Prof., Anthropology
Lambert, William W., Ph D., Harvard U. Prof., Psychology/Sociology/Anthropology
Lawler, Margaret, M.A., San Jose State Coll. Assoc. Prof., Theatre Arts
Lazzaro, Claudia, Ph.D., Princeton U. Asst. Prof., History of Art
Leavitt, Thomas W., Ph.D., Harvard U. Prof., History of Art
Lebow, Richard N., Ph D., City U. of New York. Prof., Government
Lee, David M., Ph.D., Yale U. Prof., Physics/LASSP*
Leed, Richard L., Ph.D., Cornell U. Prof., Modern Languages and Linguistics
LePage, G. Peter, Ph D., Stanford U. Asst. Prof., Physics/LNS¶
Levin, Harry, Ph D., U. of Michigan. William R. Kenan, Jr., Professor of Psychology, Psychology
Levitsky, David A., Ph.D., Rutgers U. Assoc. Prof., Nutritional Sciences/Psychology
Levy, Charles S., Ph D., Cornell U. Prof., English
Lewis, Philip E., Ph.D., Yale U. Prof., Romance Studies
Lichtenbaum, Stephen, Ph D., Harvard U. Prof., Mathematics
Littauer, Raphael M., Ph.D., Cambridge U. (England). Prof., Physics/LNS¶
Livesay, George R., Ph D., U. of Illinois. Prof., Mathematics
Long, Franklin A., Ph.D., U. of California at Berkeley. Henry R. Luce Professor of Science and Society Emeritus, Chemistry/Science, Technology, and Society
Lowi, Theodore J., Ph.D., Yale U. John L. Senior Professor of American Institutions, Government
Lurie, Alison, A.B., Radcliffe Coll. Prof., English
Lynch, Thomas F., Ph D., U. of Chicago. Prof., Anthropology
Lyons, David B., Ph.D., Harvard U. Prof., Philosophy/Law
Maas, James B., Ph.D., Cornell U. Prof., Psychology
McCall, Dan E., Ph.D., Columbia U. Prof., English
McClane, Kenneth A., M.F.A., Cornell U. Assoc., Prof., English
McClelland, Peter D., Ph D., Harvard U. Prof., Economics
McConkey, James R., Ph.D., State U. of Iowa. Prof., English
McConnell-Ginet, Sally, Ph.D., U. of Rochester. Assoc. Prof., Modern Languages and Linguistics
McCoy, John, Ph.D., Cornell U. Prof., Modern Languages and Linguistics/Chinese Literature (Asian Studies)
McDaniel, Boyce D., Ph.D., Cornell U. Floyd R. Newman Professor of Nuclear Studies, Physics/LNS¶
McGinnis, Robert, Ph.D., Northwestern U. Prof., Sociology
Mack, Ronald D., Ph.D., Columbia U. Assoc. Prof., Psychology
McLafferty, Fred W., Ph.D., Cornell U. Prof., Chemistry
McMillin, H. Scott, Ph.D., Stanford U. Prof., English
McMurry, John E., Ph.D., Columbia U. Prof., Chemistry
Majumdar, Mukul K., Ph.D., U. of California at Berkeley. H. T. Warshow and Robert Irving Warshow Professor of Economics, Economics
March, Kathryn S., Ph.D., Cornell U. Asst. Prof., Anthropology/Women's Studies
Marcham, Frederick G., Ph.D., Cornell U. Goldwin Smith Professor of English History Emeritus, History
Marcus, Philip L., Ph.D., Harvard U. Prof., English
Martin, Carolyn A., M.A., Middlebury Coll. Instructor, German Literature/Women's Studies
Masson, Robert T., Ph D., U. of California at Berkeley. Prof., Economics
Mehrez, Samia, M.A., American U. of Cairo (Egypt). Instructor, Near Eastern Studies
Mei, Tsu-Lin, Ph.D., Yale U. Prof., Chinese Literature and Philosophy (Asian Studies)
Meinwald, Jerrold, Ph.D., Harvard U. Goldwin Smith Professor of Chemistry, Chemistry
Meixner, Laura L., Ph.D., Ohio State U. Asst. Prof., History of Art
Meltzer, Leo, Ph D., U. of Michigan. Assoc. Prof., Sociology
Mermin, Dorothy M., Ph.D., Harvard U. Prof., English
Mermin, N. David, Ph.D., Harvard U. Prof., Physics/LASSP*
Messing, Gordon M., Ph D., Harvard U. Prof., Classics/Modern Languages and Linguistics
Miller, Richard W., Ph.D., Harvard U. Assoc. Prof., Philosophy
Mitra, Tapan, Ph.D., U. of Rochester. Prof., Economics
Mitsis, Phillip, Ph.D., Cornell U. Asst. Prof., Classics
Mohanty, Satya, M.A., U. of Delhi (India), M.A., U. of Illinois. Instructor, English
Monosoff-Pancaldo, Sonya, Artists Diploma, Julliard School of Music. Prof., Music
Monroe, Jonathan B., Ph.D., U. of Oregon. Asst. Prof., Comparative Literature
Moore, R. Laurence, Ph.D., Yale U. Prof., History
Morgan, Robert R., M.F.A., U. of North Carolina. Prof., English
Morgenroth, Joyce, M.A., Johns Hopkins U. Asst. Prof., Theatre Arts
Morley, Michael D., Ph.D., U. of Chicago. Prof., Mathematics
Morris, Edward P., Ph.D., Yale U. Prof., Romance Studies
Morrison, George H., Ph.D., Princeton U. Prof., Chemistry
Murra, John V., Ph D., U. of Chicago. Professor of Anthropology and Latin American Studies Emeritus
Murray, Edward, Ph.D., Yale Univ. Assoc. Prof., Music
Murray, Timothy, Ph.D., Johns Hopkins U. Asst. Prof., English
Muus, Lars, U. of Aarhus (Denmark). Instructor, Economics
Najemy, John M., Ph.D., Harvard U. Assoc. Prof., History
Nelkin, Dorothy W., A.B., Cornell U. Prof., City and Regional Planning/Science, Technology, and Society/Physics/Sociology
Nerode, Anil, Ph D., U. of Chicago. Prof., Mathematics
Newhall, Herbert F., Ph.D., Cornell U. Prof. Emeritus, Physics
Nicholson, Philip, Ph.D., California Inst. of Tech. Asst. Prof., Astronomy
Noblitt, James S., Ph.D., Harvard U. Prof., Modern Languages and Linguistics
Norton, Mary Beth, Ph.D., Harvard U. Prof., History
Novarr, David, Ph.D., Yale U. Prof., English
Nutting, Peter W., Ph.D., U. of California at Berkeley. Asst. Prof., German Literature
O'Connor, Stanley J., Ph.D., Cornell U. Prof., History of Art
Olzak, Susan, Ph.D., Stanford U. Asst. Prof., Sociology
Orear, Jay, Ph.D., U. of Chicago. Prof., Physics/LNS¶
Ostro, Steven J., Ph D., Massachusetts Inst. of Technology. Asst. Prof., Astronomy
Owen, David I., Ph.D., Brandeis U. Prof., Ancient Near Eastern History and Archaeology (Near Eastern Studies)
Palmer, Robert M., M. M., Eastman School of Music. Given Foundation Professor of Music Composition Emeritus, Music
Parker, A. Reeve, Ph.D., Harvard U. Prof., English
Parker, Roger, Ph.D., King's College, U. of London (England). Asst. Prof., Music
Parratt, Lyman G., Ph.D., U. of Chicago. Prof. Emeritus, Physics
Parrish, Stephen M., Ph.D., Harvard U. Goldwin Smith Professor of English, English
Paterson, Donald R. M., M.M., U. of Michigan. Assoc. Prof., Music
Payne, Lawrence E., Ph D., Iowa State U. Prof., Mathematics
Pempel, T. John, Ph.D., Columbia U. Prof., Government
Peterson, Charles A., Ph.D., U. of Washington. Prof., History
Pintner, Walter M., Ph.D., Harvard U. Prof., History
Platek, Richard, Ph.D., Stanford U. Assoc. Prof., Mathematics
Pohl, Robert O., Doktor, U. Erlangen (Germany). Prof., Physics/LASSP*
Polenberg, Richard, Ph D., Columbia U. Prof., History
Pontussen, Jonas, M.A., U. of California at Berkeley. Instructor, Government
Porter, Richard F., Ph D., U. of California at Berkeley. Prof., Chemistry
Possen, Uri M., Ph.D., Yale U. Assoc. Prof., Economics
Powers, David S., Ph D., Princeton U. Asst. Prof., Near Eastern Studies
Provine, William B., Ph D., U. of Chicago. Prof., History
Pucci, Pietro, Ph.D., U. of Pisa (Italy). Prof., Classics
Rabkin, Jeremy A., Ph.D., Harvard U. Asst. Prof., Government
Radzinowicz, Mary A., Ph.D., Columbia U. Prof, English
Ramage, Andrew, Ph.D., Harvard U. Assoc. Prof., History of Art
Randel, Don M., Ph.D., Princeton U. Prof., Music
Randel, Mary G., Ph D., Harvard U. Assoc. Prof., Romance Studies
Regan, Dennis T., Ph.D., Stanford U. Assoc. Prof., Psychology
Regan, Elizabeth Adkins, Ph.D., U. of Pennsylvania. Assoc. Prof., Psychology/Biological Sciences
Reppy, John D., Ph.D., Yale U. Prof., Physics/LASSP*
Richardson, Robert C., Ph.D., Duke U. Prof., Physics/LASSP*
Roe, Albert S., Ph D., Harvard U. Prof. Emeritus, History of Art
Rosecrance, Richard N., Ph.D., Harvard U. Walter S. Carpenter Jr. Professor of International and Comparative Politics, Government
Rosen, Bernard C., Ph.D., Cornell U. Prof., Sociology
Rosen, Carol G., Ph.D., Harvard U. Asst. Prof., Modern Languages and Linguistics
Rosenberg, Alex, Ph D., U. of Chicago. Prof., Mathematics
Rosenberg, Edgar, Ph D., Stanford U. Prof., English/Comparative Literature
Rothaus, Oscar S., Ph.D., Princeton U. Prof., Mathematics
Rubin, Beth A., Ph.D., Indiana U., Asst. Prof., Sociology
Rush, Myron, Ph D., U. of Chicago, Prof., Government
Ryan, Thomas A., Ph.D., Cornell U. Prof. Emeritus, Psychology
Sagan, Carl E., Ph.D., U. of Chicago. David C. Duncan Professor in the Physical Sciences, Astronomy/CRSR†
Salpeter, Edwin E., Ph.D., Birmingham U. (England). James Gilbert White Distinguished Professor in the Physical Sciences, Physics/Astronomy
Sangren, P. Steven, Ph.D., Stanford U. Asst. Prof., Anthropology
Santi, Enrico M., Ph.D., Yale U. Assoc. Prof., Romance Studies/Comparative Literature
Saul, Peter, Asst. Prof., Theatre Arts
Sawyer, Paul L., Ph.D., Columbia U. Assoc. Prof., English
Schatz, Alfred H., Ph.D., New York U. Prof., Mathematics
Scheinman, Lawrence, Ph.D., U. of Michigan. Prof., Government
Scheraga, Harold A., Ph.D., Duke U. George W. and Grace L. Todd Professor of Chemistry, Chemistry
Schuler, Richard E., Ph.D., Brown U. Assoc. Prof., Economics/Engineering
Schwarz, Daniel R., Ph.D., Brown U. Prof., English
Seltzer, Mark, Ph.D., U. of California at Berkeley. Asst. Prof., English
Sen, Shankar, Ph.D., Harvard U. Prof., Mathematics

Senderovich, Savely, Ph.D., New York U. Assoc. Prof., Russian Literature
Sethna, James P., Ph.D., Princeton U. Asst. Prof., Physics/LAASP*
Seznec, Alain, D.E.S., U. of Paris-Sorbonne (France). Prof., Romance Studies
Shapiro, Stuart L., Ph.D., Princeton U. Prof., Astronomy/Physics/CRSR†
Shaw, Harry E., Ph.D., U. of California at Berkeley. Assoc. Prof., English
Shefter, Martin A., Ph.D., Harvard U. Assoc. Prof., Government
Shoemaker, Sydney S., Ph.D., Cornell U. Susan Linn Sage Professor of Philosophy, Philosophy
Shore, Richard A., Ph.D., Massachusetts Inst. of Technology. Prof., Mathematics
Shue, Vivienne B., Ph.D., Harvard U. Assoc. Prof., Government
Siegel, James T., Ph.D., U. of California at Berkeley. Prof., Anthropology
Siegel, Sandra F., Ph.D., U. of Chicago. Assoc. Prof., English
Siemann, Robert H., Ph.D., Cornell U. Prof., Physics/LNS¶
Sievers, Albert J. III, Ph D., U. of California at Berkeley. Prof., Physics/LASSP*
Siggia, Eric D., Ph D., Harvard U. Assoc. Prof., Physics/LASSP*
Silbey, Joel H., Ph.D., U. of Iowa. Prof., History
Silsbee, Robert H., Ph.D., Harvard U. Prof., Physics/LASSP*
Silverman, Albert, Ph D., U. of California at Berkeley. Prof., Physics/LNS¶
Slatoff, Walter J., Ph.D., U. of Michigan. Prof., English
Smith, Robert J., Ph.D., Cornell U. Goldwin Smith Professor of Anthropology, Anthropology
Sokol, Thomas A., M.M., George Peabody Coll. Prof., Music
Sola, Donald F., Ph.D., Cornell U. Prof., Modern Languages and Linguistics
Somkin, Fred, Ph.D., Cornell U. Assoc. Prof., History
Speh, Birgit, Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Mathematics
Spitzer, Frank L., Ph.D., U. of Michigan. Prof., Mathematics
Staller, George J., Ph.D., Cornell U. Prof., Economics
Stallworthy, Jon H., B.Litt., Oxford U. (England). John Wendell Anderson Professor of English, English
Stalnaker, Robert C., Ph.D., Princeton U. Prof., Philosophy
Stein, Peter C., Ph.D., Massachusetts Inst. of Technology. Prof., Physics/LNS¶
Stern, Robert, Ph.D., Vanderbilt U. Assoc. Prof., Industrial and Labor Relations/Sociology
Stith, Marice W., M.A., Ohio State U. Assoc. Prof., Music
Strauss, Barry S., Ph.D., Yale U. Asst. Prof., History
Strichartz, Robert S., Ph.D., Princeton U. Prof., Mathematics
Strout, S. Cushing, Jr., Ph.D., Harvard U. Ernest I. White Professor of American Studies and Humane Letters, English
Stucky, Steven, D.M.A., Cornell U. Asst. Prof., Music
Sturgeon, Nicholas L., Ph.D., Princeton U. Assoc. Prof., Philosophy
Stycos, Joseph M., Ph.D., Columbia U. Prof., Sociology
Suñer, Margarita A., Ph.D., Indiana U. Assoc. Prof., Modern Languages and Linguistics
Svejnar, Jan, Ph.D., Princeton U. Assoc. Prof., Economics
Sweedler, Moss E., Ph D., Massachusetts Inst. of Technology. Prof., Mathematics
Talman, Richard M., Ph.D., California Inst. of Technology. Prof., Physics/LNS¶
Tarrow, Sidney G., Ph.D., U. of California at Berkeley. Prof., Government
Terzian, Yervant, Ph D., Indiana U. Prof., Astronomy/NAIC‡
Teskey, Gordon L., Ph.D., U. of Toronto. Asst. Prof., English
Teukolsky, Saul A., Ph.D., California Inst. of Technology. Prof., Physics/LNS¶/Astronomy
Theopold, Klaus H., Ph.D., U. of California at Berkeley. Asst. Prof., Chemistry
Thorbecke, Erik, Ph.D., U. of California at Berkeley. H. Edward Babcock Professor of Economics and Food Economics, Nutritional Sciences/Economics
Thorp, James O., M.F.A., U. of North Carolina at Greensboro. Asst. Prof., Theatre Arts
Tierney, Brian, Ph.D., Cambridge U. (England). Bryce and Edith M. Bowmar Professor in Humanistic Studies, History
Tigner, Maury, Ph.D., Cornell U. Prof., Physics/LNS¶
Tittler, Jonathan P., Ph.D., Cornell U. Assoc. Prof., Romance Studies
Tolbert, Pamela S., Ph D., U. of California at Los Angeles. Asst. Prof., Sociology/Industrial and Labor Relations
Trice, Harrison M., Ph.D., U. of Wisconsin. Prof., Industrial and Labor Relations/Sociology
Troxell, Barbara, M S., Curtis Inst. of Music. Assoc. Prof., Music
Tsiang, Sho-Cheih, Ph.D., London School of Economics (England). Prof., Economics
Tunali, Insan, M.S., U. of California at Berkeley. Instructor, Economics
Uphoff, Norman T., Ph D., U. of California at Berkeley. Assoc. Prof., Government
Usher, David A., Ph.D., Cambridge U. (England). Assoc. Prof., Chemistry
Usner, Daniel H., Jr., Ph.D., Duke U. Asst. Prof., History
vanCoetsem, Frans, Dr.Phil., U. of Louvain (Belgium). Prof., Modern Languages and Linguistics
Vanek, Jaroslav, Ph.D., Massachusetts Inst. of Technology. Carl Marks Professor of International Studies, Economics
Vernon, Kathleen M., Ph.D., U. of Chicago. Asst. Prof., Romance Studies
Veverka, Joseph F., Ph.D., Harvard U. Prof., Astronomy/CRSR†
Volman, Thomas P., Ph.D., U. of Chicago, Asst. Prof., Archaeology
Wachsberg, Milton W., Ph.D., Princeton U. Asst. Prof., Philosophy
Wahlbin, Lars B., Ph D., U. of Goteborg (Sweden). Prof., Mathematics
Wan, Henry Y., Jr., Ph.D., Massachusetts Inst. of Technology. Prof., Economics
Wasserman, Ira M., Ph.D., Harvard U. Asst. Prof., Astronomy/CRSR†
Waugh, Linda R., Ph.D., Indiana U. Prof., Modern Languages and Linguistics/Comparative Literature
Webster, James C., Ph.D., Princeton U. Prof., Music
Weiss, John H. Ph.D., Harvard U. Assoc. Prof., History
West, James E., Ph.D., Louisiana State U. Prof., Mathematics
Wetherbee, Winthrop, Ph.D., U. of California at Berkeley. Prof., English/Medieval Studies/Classics
Widom, Benjamin, Ph.D., Cornell U. Goldwin Smith Professor of Chemistry, Chemistry
Wiesenfeld, John R., Ph.D., Case Inst. of Technology. Prof., Chemistry
Wilcox, Charles F., Jr., Ph D., U. of California at Los Angeles. Prof., Chemistry
Wilkins, John W., Ph.D., U. of Illinois. Prof., Physics/LASSP*
Williams, L. Pearce, Ph D., Cornell U. John Stambaugh Professor of History, History
Williams, Robin M., Jr., Ph.D., Harvard U. Henry Scarborough Professor of Social Sciences, Sociology
Wilson, Kenneth G., Ph.D., California Inst. of Technology. James A. Weeks Professor in Physical Sciences, Physics/LNS¶
Wissink, Jennifer, Ph.D., U. of Pennsylvania. Asst. Prof., Economics
Wolczanski, Peter T., Ph.D., California Inst. of Technology. Asst. Prof., Chemistry
Wolff, John U., Ph.D., Yale U. Prof., Modern Languages and Linguistics
Wolters, Oliver W., Ph.D., U. of London (England). Goldwin Smith Professor of Southeast Asian History, History
Wood, Allen W., Ph D., Yale U. Prof., Philosophy
Wright, Randall D., Ph.D., U. of Minnesota. Asst. Prof., Economics
Wyatt, David K., Ph.D., Cornell U. Prof., History
Yan, Tung-mow, Ph.D., Harvard U. Prof., Physics/LNS¶
Yano, Makoto, Ph.D., U. of Rochester. Asst. Prof., Economics
Yennie, Donald R., Ph.D., Columbia U. Prof., Physics/LNS¶
Young, Martie W., Ph D., Harvard U. Prof., History of Art
Zaenen, Annie, Ph.D., Harvard U. Asst. Prof., Modern Languages and Linguistics
Zaslaw, Neal A., Ph.D., Columbia U. Prof., Music

*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, in addition, the L. H. Bailey Hortorium and the Shoals Marine Laboratory.

The offices, research laboratories, and classrooms of biology faculty members are located in many different buildings on the campus, primarily in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Veterinary Medicine.

Student services are provided by the division's Office for Academic Affairs and the Behrman Biology Center, both located in Stimson Hall, where academic advice, information on biological sciences course offerings, other important information, and counseling are available for undergraduates. The Office for Academic Affairs also follows the progress of biology majors and works closely with faculty advisers. Additional services and resources of the Biology Center include academic program planning, tutoring, lecture tapes, examination files, and information on undergraduate research opportunities. The center has comfortable areas for studying and relaxing.

The Shoals Marine Laboratory, a cooperative venture with the University of New Hampshire, is located on Appledore Island in the Gulf of Maine. Its base office in Stimson Hall provides advising and career counseling for students interested in the marine sciences and administers the SEA Semester Program for Cornell students pursuing studies at Woods Hole or aboard the schooner *Westward*.

Faculty

G. W. G. Sharp, director; H. T. Stinson, associate director; K. K. Adler, M. Alexander, W. J. Arion, R. Barker, J. P. Barlow, A. H. Bass, D. M. Bates, B. L. Bedford, A Bensadoun, E. N. Bergman, K. W Beyenbach, A. W. Blackler, S. E. Bloom, A. C. Borror, A. P. Bretscher, W. L. Brown, P. J. Bruns, P. F. Brussard, W. R Butler, T. J. Cade, J. M. Calvo, R. B. Campenot, R. R. Capranica, B. F. Chabot, J. L. Cisne, R. E. Cook, R. A. Corradino, W. B. Currie, P. J. Davies, A. Dobson, G. M. Dunny, S. J. Edelstein, T. Eisner, S. T. Emlen, H. E. Evans, P. P. Feeny, G. W. Feigenson, J. M. Fessenden-Raden, R. H. Foote, J. E. Fortune, T. D. Fox, E. L. Gasteiger, J. Gibson, Q. H. Gibson, J. H. Gillespie, M. L. Goldberg, C. A. S. Hall, B. P. Halpern, G. G. Hammes, W. Hansel, R. M. Harris-Warrick, L. A. Heppel, G. P. Hess, P. C. Hinkle, C. D. Hopkins, K. A. Houpt, T. R. Houpt, H. C. Howland, R. R. Hoy, J. W. Ingram, A. T. Jagendorf, M. N. Kazarinoff, E. B. Keller, K. J. Kemphues, K. A. R Kennedy, R. P. Korf, T. A. LaRue, F. W. Lengemann, A. C. Leopold, S. A. Levin, G. E. Likens, J. T. Lis, E. R. Loew, R. E. McCarty, A. R. McCune, R. E. MacDonald, W. N. McFarland, R. J. MacIntyre, P. L. Marks, J. K. Moffat, K. J. Niklas, J. D. Novak, D. J. Paolillo, M. V. Parthasarathy, D. Pimentel, T. R. Podleski, F. H. Pough, W. B. Provine, A. Quaroni, D. Rabinowitz, E. Racker, E. Adkins Regan, G-Y. Rhee, M. E. Richmond, J. W. Roberts, R. B. Root, M. M. Salpeter, P. W. Sherman, R. M. Spanswick, A. A. Szalay, D. N. Tapper, J. F. Thompson, R. Turgeon, B.-K. Tye, C. H. Uhl, N. W. Uhl, P. J. VanDemark, A. van Tienhoven, V. M. Vogt, C. Walcott, R. H. Wasserman, M. Watford, M. D. Whalen, Q. D. Wheeler, D. B. Wilson, W. A. Wimsatt, M. F. Wolfner, R. Wu, D. A. Young, S. A. Zahler, D. B. Zilversmit

Other Teaching Personnel

G. Albrecht, R. R. Alexander, E. M. Dawley, R. M. Dawley, C. Eberhard, P. R. Ecklund, M. F. Ferger, J. C. Glase, M. M. Green, J. M. Griffiths, J. B. Heiser, M. V. Hinkle, B. R. Land, C. H. McFadden, P. A. Murtaugh, H. C. Reiss, W. R. Schaffner, T. P. Snyder, N. T. Wheelwright, M. L. Wilkinson

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 (no longer offered), 152, 200, 201, 202, 205, 206, 301, 302, 304, or 367 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, or 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, students who intend to major in biological sciences must apply for acceptance into the major with the associate director for academic affairs, in 118 Stimson Hall. (Even those students in the College of Agriculture and Life Sciences who were admitted directly to the major must complete the application process.) Acceptance into the major requires completion of the course sequences in introductory biology, chemistry, and mathematics (see requirements 1-3 below), plus one semester of organic chemistry lectures. In addition, a 2.75 Cornell cumulative grade-point average is required for final acceptance into the major except for those students admitted directly to the major as freshmen (College of Agriculture and Life Sciences students only) or as transfers. Students in the process of completing these prerequisites for admission to the major may be accepted on a *provisional* basis. Final acceptance into the major is required for graduation with a biological sciences major. It is the student's responsibility to assure that final acceptance has been granted.

Whenever possible, students should include the introductory biology, chemistry, and mathematics sequences in their freshman schedule and complete the organic chemistry lecture course in their sophomore year. Students are not encouraged to continue with the major in biological sciences unless performance in these four subjects gives evidence of capacity to perform satisfactorily at a more advanced level.

The requirements for the biological sciences major are listed below. These courses should be taken for a letter grade, unless the course is offered for S-U grades only.

1) **Introductory biology for majors** (one year): Biological Sciences 101-103 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 eight 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. Agriculture and Life Sciences 115 may *not* be used to fulfill any part of this requirement.

4) **Organic chemistry:** Chemistry 253 and 251, or 253 and 301, or 357-358 and 251, or 357-358 and 301, or 359-360 and 251, or 359-360 and 301.

5) **Physics:** Physics 207-208* or 112-213* or 101-102. Students registering in Physics 208 are strongly encouraged to complete the optics branch. Those who take Physics 112-213 are advised to complete Physics 214 as well.

6) **Genetics:** Biological Sciences 281.

7) **Biochemistry:** Biological Sciences 330 or 331.

8) **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 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.

*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.

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); and at least one additional course selected from the following: 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; Bio S 492, Sensory Function; 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 must also 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. Biological Sciences 241 provides an introduction to plant biology and can be applied toward the concentration [see group (d)]. Five courses, including a plant physiology laboratory course, fulfill the concentration requirements, as follows: (a) either Bio S 242 and 244 or Bio S 341 and 349, Plant Physiology, Lectures and Laboratory; (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 (currently not offered); 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 Pl Pa 309, Introductory Mycology. Students may elect to complete the required five courses by taking both courses in group (c) rather than taking any in group (d). Students are encouraged to take Bio S 499, Undergraduate Research in Biology.

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 222, Neurobiology and Behavior II: Introduction to Neurobiology; 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 261 (360), General Ecology; Bio S 378 (477), Organic Evolution; and at least two of the following courses: Bio S 315-317, Ecological Animal Physiology; Bio S 343, Taxonomy of Vascular Plants; Bio S 455-457, Insect Ecology; Bio S 461, Oceanography; Bio S 462-464, Limnology; Bio S 463-465, Plant Ecology; Bio S 468, Systems Ecology; Bio S 471, Mammalogy; Bio S 473, Herpetology; Bio S 475, Ornithology; Bio S 476, Biology of Fishes.

6) *Genetics and Development:* nine credits, usually selected from the following courses: Bio S 282, Human Genetics; Bio S 347, Cytology; Bio S 378 (477), Organic Evolution; Bio S 385, Developmental Biology; Bio S 389, Embryology; Bio S 446, Cytogenetics; 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; Pl 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, among which must be a course from the neurobiology and behavior offerings. Biological Sciences 420, 498, 499, and 720 may *not* be used as this neurobiology and behavior course. The remainder of the 9 credits may be in any course (such as physiology, developmental biology, cellular biology, ecology, vertebrate or invertebrate biology, or neurobiology and behavior) approved by the adviser. 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 should consult their faculty advisers, keeping in mind the following rules, when choosing the courses to meet this requirement. A course may not count for breadth if it *could* be used (even if it is not) to fulfill a concentration requirement. No course may be used to fulfill the breadth requirement if it is also used to fulfill a concentration requirement. Students may not count two courses for breadth credit if one course is a prerequisite to the other course. Students concentrating in animal physiology and anatomy, botany, cell biology, or genetics and development should see the notes following the list of approved breadth courses.

1) *Animal Physiology and Anatomy:* Biological Sciences 214, 274, 311, 313, 315, 389; Nutritional Sciences 331.

2) *Botany:* Biological Sciences 241, 242 and 244, 341 and 349, 343, 345, 348, 441, 448; Plant Pathology 309.

3) *Cellular Biology:* Biological Sciences 305 and 307, 316, 347, 432; Microbiology 290.

4) *Developmental Biology:* Biological Sciences 385, 389, 483; Animal Science 220.

5) *Ecology, Systematics, and Evolution:* Biological Sciences 261 (360), 262 (260), 378 (477).

6) *Neurobiology and Behavior:* Biological Sciences 221, 222.

Note: Students concentrating in animal physiology and anatomy may not use Biological Sciences 347, 385, 389, or 432 to fulfill the breadth requirement.

Students concentrating in botany may not use Biological Sciences 347 to fulfill the breadth requirement.

Students concentrating in cell biology may not use Biological Sciences 313 or 345 to fulfill the breadth requirement.

Students concentrating in genetics and development may not use Biological Sciences 347, 378 (477), or any course in group (4) to fulfill the breadth requirement.

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 261 [360] or 262 [260]).
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.
4) One course from the following: 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 261 (360) or 262 (260), 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.

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. Students register for this course in 118 Stimson Hall. Any faculty member in the Division of Biological Sciences may act as a supervisor. Faculty supervisors outside the division are acceptable only if a faculty member of the division agrees to take full responsibility for the quality of the work. Information on faculty research activities and undergraduate research opportunities is available in the Behrman Biology Center, 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 deadline announced early in 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 in the Division of Biological Sciences to supervise their research. 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 of this catalog.

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 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.

Current and Former Course Numbers

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. 25 and Nov. 8; spring, Feb. 28 and Mar. 28. 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, development, evolution, ecology, and the origin of life. 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, and staff.

A laboratory course emphasizing the methods used by scientists to discover new biological knowledge. Students design and perform investigations in all of the major areas of biology. In preparation for this, exposure is given to basic biological concepts, research methodologies, relevant data-analysis techniques and statistics, instrumentation, and laboratory methods. 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). Enrollment limited to first 200 students passing unit I within prescribed time limit. 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, T 9:05; additional study and lab hours arranged at student's convenience. First lec of fall term held on Thursday, August 30. J. Calvo, 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.

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. 25 and Nov. 8; spring, Feb. 28 and Mar. 28. R. Turgeon, 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, M 1:25; occasional field trips to be arranged. R. Turgeon, C. Eberhard.

A lecture course designed to complement introductory biology 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 two examinations to be taken during lecture hours.

200 Special Studies in Biology Fall or spring. 1-3 credits. Prerequisites: transfer- or special-student status and written permission of instructor and of the associate director of the Division of Biological Sciences. Students must register using a special form available in 118 Stimson Hall. S-U grades optional, with permission of instructor.

Hours to be arranged. Staff.

A registration device for students who want to take only a portion of a regular biological sciences course—for example, only the lectures or only the laboratory in a course that includes both. Only students who have already had training equivalent to the portion of the regular course that is to be omitted may register in this manner. May not be substituted for 100-level courses and may not be used in fulfillment of college distribution requirements.

[201 History of Biology (also Biology and Society 287 and History 287) Fall. 3 credits. Prerequisite: one year of introductory biology. S-U grades optional. Not offered 1984-85.

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. Covers the period from classical antiquity to 1900.]

202 History of Biology (also Biology and Society 288 and History 288) Spring. 3 credits Prerequisite: one year of introductory biology.

Lecs, T R 10:10-11:30. Staff.

An examination of the history of biology, emphasizing the interaction of biology and culture. Original writings of biologists constitute the bulk of reading assignments. Devoted entirely to twentieth-century biology.

205 Biomedical Ethics (also Philosophy 245) Fall. 3 credits. Limited to 50 students. Primarily for sophomores, juniors, and seniors; permission of instructor required for graduate students. S-U grades optional.

Lecs, M W F 1:25. M. Wachsberg.

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 macro and micro).

206 Environmental Ethics (also Philosophy 246) Spring. 3 credits. Open to sophomores, juniors, and seniors; permission of instructor required for graduate students. S-U grades optional.

Lecs, M W F 1:25. M. Wachsberg.

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; 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 open to other students who have fulfilled the prerequisite.

Lecs, T R 8:40-9:55. D. J. Greenwood.

Human biology, behavior, and institutions are understood in modern evolutionary theory as the ongoing products of interactions between human biological evolution and cultural change. Nevertheless, numerous attempts to examine evolutionary processes in humans violate key tenets of evolutionary theory, unwittingly reproducing elements of pre-Darwinian views of human nature. After reviewing the pre-Darwinian context and reading *The Origin of Species*, the course explores attempted applications of evolutionary analysis to humans and develops a cultural explanation of the persistence of pre-Darwinian elements in many of them.

302 Alternative Food-Production Systems (also 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 open 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 Environmental Chemicals and Maladies (also Biology and Society 304 and Toxicology 304) 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.

Lecs, T R 10:10-11:30. J. M. Fessenden-Raden.

Toxic chemicals as real and potential occupational and/or environmental health hazards are studied from a multidisciplinary perspective. A molecular biological/biochemical examination of the effects of specific chemicals as they relate to cancer and reproductive impairments is discussed, together with the strategies for validating risk. Scientific data and testing methodologies for mutagens, teratogens, and carcinogens, along with social, public-policy, and ethical issues, are analyzed critically. Lectures with 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.

308 Pathogenic Microbiology (also Veterinary Medicine 317) Spring. 4 credits. Limited to 40 students. Prerequisites: Microbiology 290 and 291. Recommended: Biological Sciences 307.

Lecs, T R 1:25; labs, T R 2:30-4:25. Evening prelim: Mar. 21. G. M. Dunny, R. Pollock, L. E. Winter.

A course in medical microbiology. Lectures discuss the bacteria, fungi, and viruses that cause disease in man. Emphasis is on the pathogenic mechanisms of the microbes and the interrelationships that exist between the host and the microbe. Laboratory sessions are involved with the isolation, culture, and identification of the microbes and the further study and demonstration of the disease process through use of laboratory animal models and tissue cultures.

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.

459 Biology of Parasitism (also Veterinary Medicine 787) Spring. 2 credits. Prerequisite: one year of introductory biology for majors. Recommended: Biological Sciences 261 (360) or 262 (260) or equivalent. S-U grades optional.

Lecs, M W 2:30. D. L. Wassom.

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.

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, 231, 274, 311, 319, 330, 430, 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 serve as cosigner, taking full responsibility for the quality of the work. Students must register in the Office for Academic Affairs in 118 Stimson Hall.

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, and 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, and 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, and 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 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.

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

214 Biological Basis of Sex Differences (also Biology and Society 214 and Women's Studies 214) Spring. 3 or 4 credits (4 credits with discussion). Enrollment limited in disc section. Prerequisite: one year of introductory biology. S-U grades optional.
Lecs, T R 8:35-9:55; disc, 1 hour each week 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; 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: Mar. 12.
F. H. Pough, A. R. McCune.
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. Not offered 1984-85.
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 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 1984-85.
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 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.
Lab, M T W or R 1:25-5. R. A. Corradino, P. W. Concannon.
A series of exercises designed to illustrate basic physiologic processes in animals, including mammals. Students learn scientific methodology and analyses of results by actual performance of the exercises. Reports of laboratory activities are required. Grading is based on evaluation of these reports and on laboratory performance.

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.
Lec, R 12:20. A. van Tienhoven.
Theoretical and practical aspects of circadian and circennial 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 G1 Stimson Hall.
Fall: K. W. Beyenbach; spring: R. H. Foote.
Discussions and seminars on specialized topics in animal physiology and anatomy. Fall: epithelial transport of salt and water; spring: gamete physiology and fertilization.

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. S-U grades optional. Fee, $20.
Lecs and labs, 2 afternoons each week to be arranged. 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.

450 Mammalian Neurophysiology (also Veterinary Medicine 753) Spring. 3 credits. Prerequisite: two years of college biology. Recommended: courses in physics and biochemistry.
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.
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.
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; additional hours R evenings or 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 excitable epithelial membranes, the autonomic nervous system, cardiovascular physiology, gastrointestinal physiology, renal physiology, respiration physiology, and acid-base balance.

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.
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.
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 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 régulation 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. Not offered 1984-85.
Lecs, T R 10:10. R. A. Corradino.
An advanced course developed from the current literature on endocrine mechanisms.]

711-718 (712-718) Special Topics in Physiology Fall or spring. 1 or 2 credits for each topic. May be repeated for credit. Enrollment in each topic may be limited, with preference given to graduate students in physiology. S-U grades optional, with permission of instructor.
Discussions and seminars on specialized topics.

Fall 1984: four topics are offered.

711 Nutritional Pathophysiology 1 credit.
Sem, 1 hour each week to be arranged.
F. A. Kallfelz.

713 Epithelial Transport of Salt and Water 1 credit.
Disc, 1 hour each week to be arranged.
K. W. Beyenbach.

715 Calcium and Cell Function 1 credit.
Sem and disc, 1 hour each week to be arranged.
R. H. Wasserman.

717 Structure and Function of Joints with Emphasis on Arthritis 2 credits.
Lec, 2 hours each week to be arranged. G. Lust.

Spring 1985: four topics are offered.

712 Endocrine Regulation of Immune Development and Function 1 credit.
Lec and disc, 1 hour each week to be arranged.
J. A. Marsh.

714 Physiology of Pregnancy 2 credits.
Lab to be arranged. P. W. Nathanielsz.

716 Seminar in Insect Physiology (also Entomology 685) 1 credit. Prerequisite: permission of instructor.
Sem, 1 hour each week to be arranged.
H. H. Hagedorn.

718 Gamete Physiology and Fertilization (also Biological Sciences 410) 1 or 2 credits (2 credits with laboratory).
Lec, disc, and lab to be arranged. R. H. Foote.

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)

Sensory Function (Biological Sciences 492)

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.

232 Recombinant DNA Technology and Its Applications (also Biology and Society 232) Spring. 2 or 3 credits (3 credits with discussion). Disc limited to 20 students. Prerequisite: one year of introductory biology. May not be taken for credit after Biological Sciences 281, 330, or 331. S-U grades optional.
Lecs and discs, M W F 11:15. J. M. Calvo, F. H. Buttel, J. M. Fessenden-Raden.
An attempt to give an intelligent layperson the background needed to understand some new research discoveries and applications stemming from them. Concepts from molecular biology and molecular genetics that underlie recombinant DNA technology, together with the strategies used today in cloning genes, are discussed. Examples emphasize the vital link between basic research, often esoteric in nature, and modern biotechnology. Applications to be discussed from multidisciplinary perspectives include insulin, interferon, blood-clotting factors, growth hormones, vaccines, screening for genetic diseases, feed-stock chemicals, and plant improvement. Scientific, historical, regulatory, social, and ethical issues form the basis of the discussions.

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 (or 2 credits if taken after Biological Sciences 231). Prerequisite: Chemistry 253 or 358 or equivalent. May not be taken for credit after Biological Sciences 331.
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 core material of the course consists of twelve units of work outlined in a study guide written to accompany the textbook. Students prepare the work on their own, with help from the staff of the Study Center if desired. Students must pass a quiz on each unit to obtain a grade of C. Students who want to go beyond the core material have available a wide range of electives, including discussions of research papers and independent study of selected problems and monographs. Grades above the C level are determined by the amount of elective work satisfactorily completed and by the midterm and final exams. Missed deadlines or very poor exam scores result in grade penalties.

331 Principles of Biochemistry, Lectures Fall or 6-week summer session. 4 credits (or 2 credits if taken after Biological Sciences 231). Prerequisite: Chemistry 253 or 358 or equivalent. May not be taken for credit after Biological Sciences 330.
Lecs, M W F S 10:10. B.-K. Tye, R. E. McCarty, G. W. Feigenson.
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 written permission of instructor. Students must obtain permission of instructor by registering in 229 Stimson Hall.
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, including two of the student's own choice. Various assay methods, column chromatography, electrophoresis, and use of the scintillation counter are taught in an enzymology module taken by all students. Methods used in the clinical laboratory are applied to analyses of blood and urine samples, and some nutritional analyses are done for protein and vitamin contents of foods. In the cell component unit, procedures of cell fractionation are introduced and the unique functions of various organelles are examined. In the nucleic acid module, students are introduced to recombinant DNA methodology, isolating DNA and studying the function of transfer RNA. The lipid module includes isolation and purification procedures, thin-layer chromatography, and cholesterol and phosphate analyses.

432 Survey of Cell Biology Spring or 6-week summer session. 3 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent.
Lecs, M W F 11:15. M. V. Hinkle, J. T. Lis, 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: P. C. Hinkle; spring: R. E. McCarty.
Selected papers from the literature on a given topic are evaluated critically during six or seven two-hour meetings. Fall: structure of membrane proteins; spring: ATP-dependent proton pumps in plants and animals.

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 immortalization of cells, the cell cycle, macromolecular growth factors, cell surface properties, cell cytoskeleton, transcription and translation of papovavirus and retrovirus genes, and structure and function of viral and cellular *onc* genes.

630 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. 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, receptors, 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. Not offered 1984-85.
Lecs, T R 10:10. M. N. Kazarinoff.
The chemical, biochemical, and nutritional aspects of the vitamins and coenzymes.]

635 Mechanisms of Metabolic Regulation (also Nutritional Sciences 635) Spring. 2 credits. Prerequisites: Biological Sciences 330 or 331 and either Chemistry 358 or 360, or permission of instructor.
Lecs, T R 9:05. M. Watford.
Lectures on the identification and characterization of regulatory steps in metabolism, considered from both theoretical and practical aspects. The intracellular mechanisms of regulation are stressed, with specific examples examined in detail.

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.
Lectures covering current topics in cell biology, including a detailed discussion of secretion, endocytosis, membrane bound organelles, membrane recycling, the cytoskeleton, cell motility, junctions, the cell cycle, and related topics. Lectures on selected modern techniques in cell biology are also included. 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. Offered alternate years.
Lecs, M W F 9:05. Evening prelims to be arranged. W. J. Arion.
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 graduate students minoring in biochemistry and undergraduates concentrating in biochemistry. Enrollment limited to 72 students. Admission to the course is dependent upon the results of a personal interview with the instructor, which must be held before the first day of classes. *There is no admission to the course without the interview.* Undergraduates are urged to interview during preregistration in the fall. Students must bring to the interview a list of all chemistry and biochemistry courses taken and the credit for each. May not be taken for credit after Biological Sciences 430.
Lab, M T or R 9:05-4:25. E. B. Keller, L. A. Heppel, and staff.
Selected experiments on proteins, enzymes, DNA, and bioenergetics to illustrate basic biochemical properties. 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 1984-85; first offered spring 1986.
Lec, M 8-9:55 p.m. J. T. Lis.
Lectures on topics of eucaryotic gene organization, regulation of gene expression, RNA processing, chromatin structure, the structure and movement of chromosomes, and the architecture of the nucleus. 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.
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 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 1984: three topics are offered.

731 Bioreactors; Mathematical Models for Cell Growth ½ credit.
T R 12:20 (6 lecs), Aug. 30-Sept. 18 M. L. Shuler.

733 Biochemistry of Cytosolic Protein Degradation ½ credit.
T R 12:20 (6 lecs), Oct. 23-Nov. 8.
M. N. Kazarinoff.

735 Regulation of Gene Expression in Eukaryotes ½ credit.
T R 12:20 (6 lecs), Nov. 13-Dec. 4. E. B. Keller.

Spring 1985: three topics are offered.

732 Polyunsaturates, Antioxidants, and Immune Function ½ credit.
T R 12:20 (6 lecs), Jan. 29-Feb. 14. V. Utermohlen.

734 Enzymology of Cellulose Degradation ½ credit.
T R 12:20 (6 lecs), Feb. 19-Mar. 7. D. B. Wilson.

736 Proteases in Regulation ½ credit.
T R 12:20 (6 lecs), Apr. 23-May 9. J. F. Wootton.

751 Dilemmas for Toxicologists and Other Scientists (also Toxicology 751) Fall. 2 credits. Prerequisites: advanced graduate standing and permission of instructor. S-U grades optional.
Sem, M 2-4. J. M. Fessenden-Raden.
Case studies of dilemmas faced by practicing scientists in toxicological, chemical, and biochemical fields in academia, industry, and government, with discussions of possible approaches, alternatives, and outcomes. Readings of scientific, ethical, and general papers provide background for discussions. Topics for consideration include laboratory safety, data presentation, communicating with the public, conflicts of interest/commitment, 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.
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, second-, third-, and fourth-year graduate students majoring in biochemistry. S-U grades only.
Sem, M 5-6:30 p.m. V. M. Vogt, J. K. Moffat, P. C. Hinkle.
Each student presents one seminar per year on his or her thesis research and then meets with instructors and thesis committee members for evaluation.

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. 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 of instructor is obtained from instructor.
Lecs, M W F 10:10. P. J. Davies.
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.
Disc and lab, M T W or R 12:20-4:25. C. Reiss.
Experiments exemplify concepts covered in Biological Sciences 242 and offer experience in a variety of biological and biochemical techniques, including use of small amounts of radioisotopes

246 Ethnobotany Spring. 3 credits. Limited to 20 students. Prerequisite: written permission of instructor.
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.
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 analytic 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. Staff.
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 1984-85
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.

440 Plant Geography Spring. 2 credits. Prerequisite: Biological Sciences 343 or equivalent. Recommended: Biological Sciences 378 (477) or 463 or both. S-U grades optional, with permission of instructor. Offered alternate years.
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 378 (477) and 463. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1984-85.
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 1984-85.
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 105, 111, or 113; and either Physics 102 or 208; or permission of instructor. Offered alternate years. Not offered 1984-85.
Lecs, M 1:25 and T R 10:10. Staff.
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.
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. Not offered 1984-85.
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 adaptions, 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. Not offered 1984-85.
Lecs, M W F 9:05. P. J. Davies, D. J. Paolillo.
Explores the changes that occur during plant growth and development and their control: morphological and anatomical changes in apices, tissue differentiation, organ formation, embryo development, gene regulation, hormone action and interaction, the influence of light in development, flowering, fruiting, dormancy, abscission, and senescence.]

[645 Families of Tropical Flowering Plants Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades only. Offered alternate years. Not offered 1984-85.
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 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 1984-85.
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.
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. Not offered 1984-85.
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.
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.
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.
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. Not offered 1984-85.
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. Not offered 1984-85.
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

Field Phycology (Biological Sciences 441)

Introductory Mycology (Plant Pathology 309)

Mycology (Plant Pathology 709)

Mycology Conferences (Plant Pathology 649)

Plant Ecology, Lectures and Laboratory (Biological Sciences 463 and 465)

Plant Ecology Seminar (Biological Sciences 669)

Taxonomy of Fungi (Plant Pathology 729)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

Ecology, Systematics, and Evolution

261 (360) General Ecology Fall. 3 credits. For students concentrating in ecology or a related subject. Not open to freshmen. Prerequisite: one year of introductory biology for majors. May not be taken for credit after Biological Sciences 262 (260).
Lecs, T R 9:05; disc, W or R 1:25, 2:30, or 3:35. P. P. Feeny and staff.
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.

262 (260) Ecology, Environment, and Society Spring. 3 credits. Prerequisite: one year of introductory biology or written permission of instructor. May not be taken for credit after Biological Sciences 261 (360).
Lecs, T R 11:15; disc, T or R 1:25, 2:30, or 3:35. 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; 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: Mar. 12. F. H. Pough, A. R. McCune, E. M. Dawley, R. M. Dawley.
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.

275 Human Biology and Evolution Fall. 3 credits. S-U grades optional, with permission of instructor.
Lecs, M W F 10:10. K. A. R. Kennedy, J. D. Haas, R. Dyson-Hudson.
An introduction to the biology of *Homo sapiens* through an examination of human evolution, biological diversity, and modes of adaptation to past and present environments. Evolutionary theory is reviewed in relation to the current evidence from the fossil record and studies of the evolution of human behavior. A survey of human adaptation covers a complex of biological and behavioral responses to environmental stress. Human diversity is examined as the product of long-term evolutionary forces and short-term adaptive responses. Topics such as creationism, the Piltdown fraud, the sociobiology debate, genetic engineering, race and IQ, and racism are presented as examples of current issues in human biology.

[315 Ecological Animal Physiology, Lectures Fall. 3 credits. Prerequisite: one year of introductory biology for majors. Offered alternate years. Not offered 1984-85.
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.]

[317 Ecological Animal Physiology, Laboratory Fall. 1 credit. Limited to 12 students. Prerequisite: concurrent enrollment in Biological Sciences 315. Offered alternate years. Not offered 1984-85.
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.]

[371 Human Paleontology Fall. 4 credits. Prerequisite: one year of introductory biology or Anthropology 114 or permission of instructor. Offered alternate years. Not offered 1984-85.
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.]

378 (477) Organic Evolution Fall. 4 credits. Prerequisite: Biological Sciences 281 or permission of instructor. Recommended: Biological Sciences 261 (360) or 262 (260). S-U grades optional. Next offered spring 1986.
Lecs and demonstrations, T R 10:10-12:05. 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.

[455 Insect Ecology, Lectures (also Entomology 455) Fall. 2 credits. Prerequisites: Biological Sciences 261 (360) and Entomology 212 or their equivalents. Recommended: concurrent enrollment in Biological Sciences 457. Offered alternate years. Not offered 1984-85.
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. Not offered 1984-85.
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.]

461 Oceanography Fall. 3 credits. Prerequisites: college physics and either Biological Sciences 261 (360) or 262 (260), or written permission of instructor. S-U grades optional.
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.

462 Limnology, Lectures Spring. 3 credits. Prerequisite: Biological Sciences 261 (360) or 262 (260) or written permission of instructor.
Lecs, M W F 11:15. P. A. Murtaugh.
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. Not offered 1984-85; next offered 1985-86.
Lecs, M W F 11:15. P. L. Marks, D. Rabinowitz.
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. Not offered 1984-85; next offered 1985-86
Lab, F 12:05-5. P. L. Marks, D. Rabinowitz.
Laboratory and field exercises in plant ecology. Field studies of plant communities and techniques for the analysis of community data are emphasized.]

[468 Systems Ecology Fall. 4 credits. Prerequisite: Biological Sciences 261 (360) or 262 (260) or equivalent. Recommended: Computer Science 102 and calculus. S-U grades optional. Offered alternate years. Not offered 1984-85.
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 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 and Biology and Society 412) 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, 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. Not offered 1984-85. 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 Paleobiology (also Geological Sciences 472) Spring. 3 credits. Prerequisites: one year of introductory biology for majors and either Biological Sciences 212 or 274, Geological Sciences 376, or permission of instructor.

Lecs, M W F 12:20. J. L. Cisne and staff.

A survey of the major groups of organisms and their evolutionary histories. Intended to fill out the biological backgrounds of geology students and the geology backgrounds of biology students concerning the nature and significance of the fossil record for their respective studies.

[473 (472) Herpetology Fall 4 credits Recommended: Biological Sciences 274. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1984-85. 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. Not offered 1984-85.

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. Fee, $15.

Lecs and labs, T R 12:20-4:25; occasional field trips and special projects. Evening prelim: Oct. 23. N. T. Wheelwright, T. J. Cade.

Lectures cover various aspects of the biology of birds, including anatomy, physiology, classification, evolution, migration, ecology, and distribution and are fully integrated with laboratory studies. Laboratory includes studies of morphology, plumages, and specimen identification of avian families of the world and species of New York. Independent projects emphasize field identification and research skills.

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.

Lecs, M W F 9:05; lab, M 1:25-4:25. A. R. McCune.

An introduction to the study of fishes: their structure, evolution, distribution, ecology, physiology, behavior, classification, and identification, with emphasis on local species.

[478 Biology of Fishes, Laboratory Fall. 1 credit. Limited to 15 students. Prerequisite: concurrent enrollment in Biological Sciences 476. Offered alternate years. Not offered 1984-85.

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 261 (360) or 262 (260), a taxon-oriented course, and permission of instructor. Estimated cost of room and board (exclusive of transportation), to be announced Not offered 1984-85.

Lecs and labs to be arranged. Staff.

This course provides students an opportunity to learn techniques and a new biota by participating in an intensive series of field exercises. An extended field trip is scheduled during either intersession or spring break. The region visited, trip objectives, and other details are announced by the instructor in charge in the division's catalog supplement issued at the beginning of the semester. Meetings on campus are devoted to orientation and reports on completed projects.]

661 Environmental Biology (also Agriculture and Life Sciences 661) Fall and spring. 2 or 3 credits each term. Limited to 12 students. Prerequisite: permission of instructor.

Sem, W 12:20. 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.

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.

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. P. A. Murtaugh.

A seminar course on advanced limnological topics.

[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 1984-85.

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 used throughout as tools to address those issues. Lectures cover both standard material and current journal articles.]

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. Fall: F. H. Pough; spring: vertebrate biology staff.

Seminar presentations and discussions by students on areas of current research in vertebrate biology. Topics vary from semester to semester.

673 Human Evolution: Concepts, History, and Theory Fall. 3 credits. Prerequisite: one year of introductory biology or Anthropology 114 or permission of instructor. Offered alternate years.

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 and biological 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. Not offered 1984-85.

Lecs, M W 1:25; labs, M W 2:30-4:25; 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.]

760 Special Topics in Evolution and Ecology Fall or spring. 1-3 credits. May be repeated for credit. Enrollment limited. S-U grades optional, with permission of instructor.

Hours to be arranged. Staff.

Independent or group intensive study of special topics of current interest. Content varies and is arranged between student and staff member.

761 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. Staff.

A seminar course on selected topics in population and community ecology. Topics vary from year to year.

765 Autecology/Population Ecology Fall. 4 credits. Prerequisite: Biological Sciences 261 (360) or equivalent. S-U grades optional.

Lecs and discs, T R 10:10-12:05. S. A. Levin and staff.

Comparison of the responses and adaptations of organisms to environments in selected ecosystems. Emphasis on similarities and differences in molecular and organismal mechanisms by which plants and animals cope with their environments. Critical examination of the properties and dynamics of populations. Emphasis on theories of adaptation, population structures, dynamics, and regulation.

766 Communities and Ecosystems Spring. 4 credits. Prerequisite: Biological Sciences 261 (360) or equivalent.
Lecs, T R 10:10-12:05. D. Rabinowitz and staff.
Structure, dynamics, and evolution of natural communities; species diversity; niches and gradient relations; and succession, climax, and disturbance. Comparative aspects of terrestrial, marine, and freshwater communities. Analysis of ecosystems in terms of energy flow, biogeochemistry, and model systems. Emphasis on functional and structural properties of communities and ecosystems.

Related Courses in Other Departments

Advanced Soil Microbiology (Agronomy 666)

Advanced Work in Animal Parasitology (Veterinary Medicine 737)

Animal Parasitology (Veterinary Medicine 510)

Biology of Parasitism (Biological Sciences 459 and Veterinary Medicine 787)

Biology of Plant Species (Biological Sciences 442)

Early People: Human Cultural and Biological Evolution (Anthropology 203 and Archaeology 203)

Ecology and Human Biology (Anthropology 375)

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, 636, 672)**

Related courses in natural resources **(Natural Resources 302, 330, 430, 603)**

Soil Microbiology, Lectures (Agronomy 476)

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 (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. Labs 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. P. J. Bruns, T. D. Fox, M. L. Goldberg, R. J. MacIntyre.
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 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. Staff.
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.
An introduction to the morphogenetic, cellular, and genetic aspects of the developmental biology of animals.

389 Embryology Spring. 4 credits. Prerequisite: one year of introductory biology. Offered alternate years.
Lecs, M W 11:15; labs, M W 2-4:25. A. W. Blackler.
A course in the embryonic development of vertebrate animals, with emphasis on the comparative aspects of morphogenesis and function at the tissue level. The laboratory has a strong morphogenetic bias, stressing 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. Staff.

481 Population Genetics Fall. 3 credits. Prerequisite: Biological Sciences 281 or equivalent.
Lecs, M W 10:10. T. P. Snyder.
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. Prerequisites: Biological Sciences 281 and 330 or 331. Recommended: Biological Sciences 385. Offered alternate years.
Lecs, M W F 11:15. M. F. Wolfner.
An examination of the molecular biology of developing systems, with emphasis on the genomic, transcriptional, and translational mechanisms involved in regulating gene expression during development. Both prokaryotic and eukaryotic systems are considered, but emphasis is on the latter. Topics to be discussed include changes in chromatin structure, DNA rearrangements, control of RNA synthesis and processing, translational controls, nucleo-cytoplasmic interactions, and genetic responses to hormone treatment.

[484 Molecular Evolution Spring. 3 credits. Prerequisites: Biological Sciences 281 and organic chemistry. Offered alternate years. Not offered 1984-85.
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. 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 are discussed.

487 Microbial Genetics, Laboratory Fall. 3 credits. Primarily for upperclass students. Limited to 18 students. Prerequisites: concurrent or previous enrollment in Biological Sciences 485, Microbiology 290 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.

687 Biological Sciences in Industry: An Overview Fall. ½ credit. Prerequisite: Biological Sciences 330 or 331. S-U grades only.
Lecs, T R 1:25 (6 lecs), Sept. 4-20. R. E. Snoke.
An overview of biological research in industry. Begins with the role of research administration and the process of project selection, following several examples currently used to produce product, and ends with a summary of how data are reported for patent application.

688 Genetics of Unicellular Eucaryotes Spring. 1 credit. Prerequisites: Biological Sciences 281, 330 or 331, and 485, or written permission of instructor. S-U grades optional.
Lec, R 1:25. P. J. Bruns, T. D. Fox.
An advanced overview of genetic studies in two widely divergent groups of unicellular eucaryotes: ciliates and yeasts. Both formal genetic and molecular approaches to selected problems of biological interest in these organisms are discussed.

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. Staff.
A seminar course with critical presentation and discussion by students of original research papers in a particular area of current interest. Content of the course and staff direction vary each year and are announced a semester in advance.

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 378)

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 required of students concentrating in neurobiology and behavior. Each disc limited to 20 students, with preference given to students concentrating in neurobiology and behavior. Not open to freshmen. Prerequisite: one year of introductory biology for majors. May be taken independently of Biological Sciences 222. S-U grades optional.

Lecs, M W F 12:20; disc to be arranged. T. Eisner.

A general introduction to the field of behavior and integrative neuroscience. Topics include evolution and behavior, behavioral ecology, chemical 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 required of students concentrating in neurobiology and behavior. Each disc limited to 20 students, with preference given to students concentrating in neurobiology and behavior. Not open to freshmen. Prerequisites: one year of introductory biology for majors and one year of chemistry. May be taken independently of Biological Sciences 221. S-U grades optional.

Lecs, M W F 12:20; disc to be arranged.
R. M. Harris-Warrick.

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 222 or a course in psychology. S-U grades optional.

Lecs, T R 10:10-11:30; disc to be arranged.
E. Adkins Regan, R. E. Johnston.

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. DeVoogd.

Experiments designed to provide research experience in animal behavior (including learning) and its neural and hormonal mechanisms. A variety of techniques, species, and behavior patterns are included.

[395 Vision (also Applied and Engineering Physics 611) Fall. 3 credits. Prerequisites: Chemistry 104 or 208; Mathematics 106, 111, or 113; and Physics 102 or 208; or permission of instructor. Offered alternate years. Not offered 1984-85.

Lecs, M 1:25 and T R 10:10. Staff.

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. Not offered 1984-85.

Lecs, M W F 9:05. B. P. Halpern.

This course is taught in 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 are considered. General principles of sensory systems and auditory, visual, and somesthetic systems are covered. One aspect of each system (e.g., localization of objects in space by sound, color vision, and thermoreception) is selected for special attention. At the level of *An Introduction to the Physiology of Hearing*, by J. O. Pickles, and *Photoreceptors: Their Role in Vision*, by A. Fein and E. Z. Szuts.]

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.

[424 Neuroethology Fall. 3 credits. Prerequisites: Biological Sciences 221 and 222. S-U grades optional for graduate students only. Offered alternate years. Not offered 1984-85.

Lecs, M W 11:15; disc, F 11:15. R. R. Capranica.

The integrated study of neurobiology and animal behavior. Representative topics include acoustic communication in insects and amphibians, vocal mechanisms and plasticity of bird song, mammalian hearing, bat echolocation, prey detection by owls, electroproduction and electroreception in fish, neurophysiology and behavior of pheromone communication, neurobehavior of vision in anurans, mammalian visual processing, command neurons and decision networks, locomotion and motor-pattern generation, escape behavior in invertebrates, and neural correlates of learning. Assigned readings include original articles in the scientific literature. A term paper on the neural basis of animal behavior is required.]

425 Field Studies of Animal Behavior Fall. 4 credits. Limited to 12 students. Prerequisites: Biological Sciences 221 and written permission of instructor. Recommended: Biological Sciences 427. Fee, $20.

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. Staff.

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 development and 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 wild and domestic plants, insects, birds, and mammals in upstate New York.

426 Electronics for Neurobiology Spring. 3 credits. Prerequisites: Biological Sciences 222 and one year of introductory physics.

Lecs, T R 9:05; lab, 4 hours each week to be arranged. B. R. Land.

Electronics as applied to electrophysiological instrumentation, data acquisition, and analysis. Topics include a review of basic electrical concepts, the cell as a circuit, design of amplifiers and pulse generators for biological use, and computer interfacing to an experiment.

427 Vertebrate Social Behavior Spring. 3 credits. Limited to 30 students. Prerequisites: Biological Sciences 221, and 261 (360) or 262 (260). S-U grades optional, with permission of instructor. Offered alternate years.

Lecs and discs, T R 2:30-4:20. S. T. Emlen.

The study of the adaptive bases of social behavior is examined. The first half of the course deals with behavioral ecology, emphasizing the effects of ecological constraints of resource dispersion and predation pressures on the structure of animal societies. The second half of the course emphasizes genetic sociobiology, examining such topics as female choice, parent-offspring conflict, behavioral nepotism, and the evolution of phenotypic altruism.

491 Principles of Neurophysiology Fall. 4 credits. Limited to 20 students. Prerequisite: Biological Sciences 222 or written permission of instructor.

Lecs, T R 10:10; lab, M or W 12:20-4:25; additional hours to be arranged. B. R. Land.

A lecture and laboratory course designed to teach the theory and techniques of electrophysiological study of the nervous system. Topics include electrical modeling of cells, intracellular and extracellular recording, and analysis of laboratory data.

492 Sensory Function (also Psychology 492) Spring. 4 credits. Prerequisite: Biological Sciences 222 or 311 or an upper-level course in biopsychology or permission of instructor. S-U grades optional.

Lecs, M W F 10:10; disc, 1 hour each week to be arranged. H. C. Howland, B. P. Halpern.

Classical topics in sensory function such as vision, hearing, touch, and balance, as well as some more modern topics, including sensory coding, location of stimulus sources in space, and the development of sensory systems. Both human and nonhuman systems are discussed. In all cases the chemical, physical, and neurophysiological bases of sensory information are treated and the processing of this information is followed into the central nervous system. At the level of *The Senses*, edited by Barlow and Mollon; *Neurons without Impulses*, edited by Roberts and Bush; and *Advances in Vertebrate Ethology*, edited by Ewert, Capranica, and Ingle.

[493 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. Not offered 1984-85.

Lecs, 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 or 222 and either 330 or 331. S-U grades optional. Offered alternate years. Not offered 1984-85.

Lecs, 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 222 and either 330 or 331, or permission of instructor. S-U grades optional. Offered alternate years.

Lecs 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 to neurological disorders is described. Readings are primarily from journal articles.

622 Laboratory in Neural Systems and Behavior Spring. 2 credits. Limited to 6 students concentrating in neurobiology and behavior. Prerequisites: Biological Sciences 221, 222, and 491, and permission of instructor. Admission to the course requires a personal interview with the instructor. Offered alternate years.

Lecs and labs, 6 hours each week to be arranged. R. R. Hoy and staff.
A series of research-oriented exercises dealing with the neural basis of behavior. Techniques in anatomy, physiology, and behavior are taught. The experimental materials are primarily invertebrate animals in which a cellular analysis is feasible.

[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. Not offered 1984-85.

Lecs, M W F 1:25. T. Eisner, J. Meinwald, W. L. Roelofs, and guest speakers.
The production, transmission, and reception of chemical signals in communicative interactions of animals, plants, and microorganisms. Studies of insects are emphasized. Specific topics are treated with varying emphasis on chemical, biochemical, 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 1984-85.

Lecs, 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.]

626 Sex Differences in Brain and Behavior (also Psychology 524) Spring. 2 credits. Limited to 12 students. Prerequisite: Biological Sciences 322 or permission of instructor.

Disc and sem, M W 3:35-5:30. T. DeVoogd.
A survey of the newly discovered animal models for sex differences in the brain. Topics include the role of steroids in brain development, whether hormones can modify the structure of the adult brain, and the consequences of such sex differences in anatomy for behavior.

[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. Not offered 1984-85.

Lecs, 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 undergraduate 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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $615.

Daily lecs and fieldwork for 2 weeks. SML faculty.
The ecological significance of behaviors of coastal organisms, with emphasis on field and laboratory research methods. Lectures and readings address the major subareas of behavior (communication, orientation, social behavior, foraging, predator avoidance, and sensory mechanisms). Each student engages in short-term behavioral observation and prepares a research proposal for studying a problem within the course subject area.

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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $445.

Daily lecs, labs, and fieldwork for 10 days. SML faculty.
Designed to give an overview of living marine organisms (algae, invertebrates, fishes, marine mammals, and shorebirds) and of the environment they inhabit. Fieldwork is emphasized. Occasional lectures and films deal with additional topics such as coastal-zone problems, marine fisheries, economics of marine organisms, and educational resources of the marine environment. 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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $1,175.

Daily lecs, 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 is also given to introductory physical and chemical oceanography and marine geology. Marine ecology and the effects of human activity on the marine environment are included.

365 Underwater Research Summer. 2 credits. Prerequisites: one year of college-level biology or other supporting subject, recognized scuba certification, and a medical examination. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $710.

Daily lecs and fieldwork for 2 weeks. Team-taught by a diving-safety officer, two faculty members, and guest lecturers.

For competent divers only. Covers special problems of underwater research, including random sampling, use of dive tables, underwater instrumentation, special diving equipment, photographic techniques, integration with boat and shore facilities, and emergency procedures. Students are required to conduct a transect study on both soft and hard substrates.

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 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 and 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. Covers the elements of maritime history, law, literature, and art necessary to appreciate our marine heritage and to understand the political and economic problems of contemporary maritime affairs.

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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $935.
Daily lecs, labs, and fieldwork for 3 weeks. SML faculty.
An introduction to the physiological ecology and functional morphology of marine plants and animals, with emphasis on selected algal and invertebrate examples from the Gulf of Maine. Topics covered include photosynthesis in the marine environment; respiration in intertidal organisms; carbohydrates, proteins, and lipids as nutrients in the sea; acclimation and tolerance of tide-pool biota; and biological responses to competition and grazing. Field and laboratory exercises explore principles and procedures used to characterize the physical, chemical, and biotic environment of intertidal and shallow subtidal organisms, including determination of temperature, light, salinity, oxygen and nutrient levels, and *in vivo* functional analyses of metabolic phenomena.

441 Marine Botany: Ecology of Marine Plants Summer. 4 credits. Prerequisite: Biological Sciences 364 or general familiarity with marine algae. S-U grades optional. A special 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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $895.
Daily lecs, 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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $935.
Daily lecs, 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_2 nutrients, organic material, and suspended materials in coastal waters, with some work on the analysis of coastal sediments.

477 (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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $935
Daily lecs, labs, and fieldwork for 3 weeks. SML faculty.
Topics in marine vertebrate biology emphasizing laboratory studies, field collections or observations, and readings from the current literature. Topics covered include systematics of fishes of the Gulf of Maine, elasmobranch physiology, interpretation of life history and parameters from otolith microstructure, teleost skeletomuscular structure and function, population biology and the contemporary Gulf of Maine fishery, Mesozoic marine reptiles, the biology of sea turtles in cold water, coloniality in sea birds, avian adaptations to life at sea, evolution and systematics of marine mammals, diving physiology, and ecology and conservation of existing marine mammal populations.

482 Reproduction and Development of Invertebrates 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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $895.
Daily lecs, 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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $345.
Daily lecs and discs for 1 week. SML faculty.
Intended for persons interested in careers in management of marine or coastal resources or in the natural sciences. Subjects include law and policy related to ocean dumping, marine sanctuaries, environmental impact statements, water and air pollution, fisheries management, offshore gas and oil production, and territorial jurisdiction. Lectures on the status and history of law are accompanied by discussion of relevant policy and analysis of the efficacy of various legal techniques. A case study that requires extensive use of the laboratory's library and personnel is assigned. The week concludes with a mock hearing.

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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $630.

Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.

Dispersion modeling and the effects of pollutants (including oil, outfalls, solid wastes, sludge and dredge spoils, and radioactive wastes) are discussed from the perspectives of elementary physical oceanography and biological processes. Laboratories include basic methods for targeting and tracing waste water; organic carbon determinations; microbial tests for *Salmonella*, *E. coli*, and *Streptococcus*; and practical field projects.

Marine and Coastal Geology (Geological Sciences 213) 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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $345.

Daily lecs, labs, and fieldwork for 1 week. SML faculty.

With "the New England coast" defined as beginning at the -200 meter isobath and proceeding westward, this course examines specific geological events and processes important in shaping the area's bedrock and surficial sediments. Petrology, geophysics, and the Pleistocene geology of the region are investigated. Consideration of the geologic history of New England within the plate tectonic model is emphasized. Examination of insular geology is used to integrate micro-, meso-, and macroscale geological evolution of continental margins in general. Marine geology is approached through basic geophysical exploration and bottom-sediment collection followed by data analysis and interpretation. Experience aboard a coastal research vessel is an integral part of the course.

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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $345.

Daily lecs 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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $360.

Daily lecs, labs, and fieldwork for 1 week. SML faculty.

An introduction to the subject and a review of this contemporary subdiscipline of archaeology. The approach of the course is practical, with a strong potential for actual on-site experience in search, site recognition, survey, and recording. The course also covers the history and development of the subject, the legal aspects of underwater research, and the worldwide potential of the field. Since any archaeological research project involves a great deal more than digging, the course provides ample opportunities for those who are interested in the subject but are not divers or sufficiently experienced in scuba.

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, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $345.

Daily lecs, labs, and fieldwork for 1 week. SML faculty.

An examination of coastal and adjacent freshwater wetlands from historic, destruction, and preservation perspectives, including fresh- and salt-marsh ecology and management. Field trips to selected examples of the wetlands under discussion and follow-up laboratories emphasize successional features, plant identification and classification, and examination of the dominant insect and vertebrate associations.

Courses in Biophysics

Biophysics is an interdisciplinary undergraduate and graduate program. 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
Beyenbach, Klaus W., Ph.D., Washington State U. Assoc. 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
Cook, Robert E., Ph.D., Yale U. Assoc. Prof., Ecology and Systematics/Cornell Plantations
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
Kemphues, Kenneth J., Ph.D., Indiana U. Asst. Prof., Genetics and Development
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
Moffat, 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
Paolillo, Dominick J., Jr., Ph.D., U. of California at Davis. Prof., Plant Biology*

Parthasarathy, Mandayam V., Ph.D., Cornell U. Prof., Plant Biology
Pough, F. Harvey, Ph.D., U. of California at Los Angeles. Prof., Ecology and Systematics/Physiology
Quaroni, Andrea, Ph.D., U. of Pavia (Italy). 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
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. Assoc. 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
Dawley, Ellen M., Ph.D., U. of Connecticut. Instructor, Ecology and Systematics
Dawley, Robert M., Ph.D., U. of Connecticut. Instructor, Ecology and Systematics
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
Green, Melvin M., Ph.D., U. of Minnesota. Visiting Prof., Genetics and Development
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
Land, Bruce R., Ph.D., Cornell U. Sr. Lecturer, Neurobiology and Behavior
McFadden, Carol H., Ph.D., Cornell U. Lecturer, Physiology
Reiss, H. Carol, M.S., Cornell U. Lecturer, Plant Biology
Wheelwright, Nathaniel T., Ph.D., U. of Washington. Visiting Asst. Prof., Ecology and Systematics
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
Bedford, Barbara L., Adjunct Asst. Prof., Ecosystems Research Center/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., Assoc. Prof., Animal Science/Physiology
Currie, W. Bruce, Assoc. Prof., Animal Science/Physiology
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

Bass, Andrew H., Ph.D., U. of Michigan. Asst. Prof., Neurobiology and Behavior
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
Chabot, Brian F., Ph.D., Duke U. Assoc. Prof., Ecology and Systematics‡
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/Veterinary Physiology†
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. Assoc. 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
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
Salpeter, Miriam M., Ph.D., Cornell U. Prof., Neurobiology and Behavior/Applied and Engineering Physics‡§
Sherman, Paul W., Ph.D., U. of Michigan. Assoc. Prof., Neurobiology and Behavior
Turgeon, 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

Albrecht, Genia S., Ph.D., U. of Washington. Lecturer, Biochemistry, Molecular and Cell Biology
Eberhard, Carolyn, Ph.D., Boston U. Sr. Lecturer, Plant Biology
Murtaugh, Paul A., Ph.D., U. of Washington. Lecturer, Ecology and Systematics
Snyder, Thomas P., Ph.D., U. of Kansas. Visiting Assoc. Prof., Genetics and Development

Joint Appointees

Hammes, Gordon G., Horace White Professor of Chemistry and Biochemistry, Chemistry/Biochemistry, Molecular and Cell Biology
Likens, Gene E., Adjunct Prof., The New York Botanical Garden Institute of Ecosystem Studies, Cary Arboretum/Ecology and Systematics
Provine, William B., Prof., History/Ecology and Systematics
Regan, Elizabeth Adkins, 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
Sharp, Geoffrey W. G., D.Sc., U. of London (England). Prof., Pharmacology
Tapper, Daniel N., Ph.D., Cornell U. Prof., Physiology/Veterinary Physiology/Neurobiology and Behavior
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
Dunny, Gary M., Asst. Prof., Microbiology/Genetics and Development
Evans, Howard E., Prof., Anatomy/Biological Sciences
Gillespie, James H., Prof., Microbiology/Biological Sciences
Houpt, Katherine A., Assoc. Prof., Veterinary Physiology/Physiology
Houpt, T. Richard, Prof., Veterinary Physiology/Physiology
Kallfelz, Francis A., Prof., Clinical Sciences/Veterinary Physiology/Physiology
Nathanielsz, Peter, Leading Prof., Clinical Sciences/Veterinary Physiology/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/Genetics and Development

Division of Nutritional Sciences

Joint Appointees

Arion, William J., Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
Bensadoun, Andre, Prof., Nutritional Sciences/Physiology
Kazarinoff, Michael N., 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.

College of Engineering

Administration

William B. Streett, acting dean
K. Bingham Cody, associate dean for professional programs
Richard H. Lance, associate dean for undergraduate affairs
Kenneth E. Torrance, associate dean for graduate study and research
Ron W Simmons, assistant dean for minority programs
Gilbert F. Rankin, director of administrative operations and facilities
John Belina, director of admissions
Mariea T. Blackburn, associate director of admissions
Robert L. Smith, assistant director of admissions
Gladys J. McConkey, director of publications
Jane H. Pirko, registrar

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.

Program on Microscience and Technology. A "center of excellence" sponsored by the Semiconductor Research Corporation to promote research essential to the development of VLSI (very-large-scale-integrated) devices and circuits.

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. Applicants from foreign countries must submit the results of the Graduate Record Examinations aptitude tests and must have an adequate command of the English language. 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 Management

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, which is 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

*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.

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 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 calculus take Mathematics 191. Students with some knowledge of 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 100, Introduction to Computer Programming. Before graduation they must take an additional course with a significant amount of computing applications; this may be an engineering distribution course or part of the field program. Courses that satisfy this requirement are Engr 211, Engr 222, Engr 264, Engr 241, CEE 301, EE 424, M&AE 489, M&AE 670, and M&AE 575. The preferred choice for students intending to enter the Field Program in Engineering Physics is Engr 264; in Chemical Engineering, Engr 222 or 241; in Computer Science, Engr 222; in Electrical Engineering, Engr 211; in Civil and Environmental Engineering, CEE 301; in Mechanical Engineering, M&AE 489, M&AE 670, or M&AE 575; and in Operations Research and Industrial Engineering, Engr 211.

Engineering Distribution

Four engineering distribution courses (12 credits) are required. These courses must be selected from four of the eight areas listed below. A student may use only one of the possible substitutions described.

1) *Scientific computing*
Engr 211, Computers and Programming
Engr 222, Introduction to Scientific Computing
Engr 241, Engineering Computation

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
Engr 264, Computerized-Instrumentation Design

6) *Thermodynamics and energy balances*
Engr 219, Mass and Energy Balances
Engr 221, Thermodynamics

7) *Earth and life sciences*
Engr 201, Introduction to the Physics and Chemistry of the Earth

8) *Introduction to engineering*
Several courses are offered to introduce freshmen to the various fields of engineering. Some of these courses, which begin with Engr 102, 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 lease 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 defined by the College of Arts and Sciences as humanities and history (see pp. 96-97, group 2b and group 3a) 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;
Theatre Arts: all history, literature, and theory courses and all film courses except 377 and 477.

b) Social Sciences
This category includes all courses defined by the College of Arts and Sciences as social sciences (see p. 96, group 2a) as well as the following:

College of Agriculture and Life Sciences: Agricultural Economics 150, 250, 332; Communication Arts 116, 120, 314, 204, 418; 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 defined by the College of Arts and Sciences as expressive arts (see p. 97, group 3b) 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.

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. The office also offers advising and counseling services, publishes a college newsletter, maintains files on scholarships, and provides support for students in the college. Students in good standing may affiliate with a field after one full year of study, and they *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 calculus may take Physics 112 in term one. Students with an interest in bioengineering may take biology in terms one and two as approved electives. Students preparing to study medicine should take one year of biology and Chemistry 208 in the first year.

Term 1	*Credits*
Math 191 or 193, Calculus for Engineers	4
Chem 207, General Chemistry	4
Engr 100, 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 100, Introduction to Computer Programming, or 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. Students who intend to enter the Field Program in Chemical Engineering should take Chemistry 208 and Chemistry 287-289 as approved electives in terms two and three, and Chemistry 288-290 as a field course in term four. Students intending to major in mechanical engineering should take Engr 203, and prospective agricultural engineers should take Engr 221 as field courses in terms three or four.

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 42 credits in the major and minor subjects, including at least 21 credits in 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.

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 advanced 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. No more than 72 credits may be transferred.

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 1983-84 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.

Residence Requirements

Candidates for an undergraduate degree in engineering must spend at least four semesters or an equivalent period of instruction as full-time students at Cornell. They must also spend at least three semesters of this time affiliated with an engineering field program or with the College Program.

Students who are not enrolled at Cornell as full-time students may take individual courses through the Extramural Division. No more than 9 credits earned through study in the Extramural Division may be used to satisfy the requirements for the bachelor's degree in engineering.

Degree candidates may spend periods of time studying away from the Cornell campus, with appropriate authorization. Such students must register for study in absentia and pay a fee. Information on programs sponsored by other universities and on procedures for direct enrollment in foreign universities is available at the Career Center. Programs should be planned in consultation with the staff of the Office of Undergraduate Affairs, who can provide information on credit-evaluation policies and assist in the petitioning process.

Leave of Absence and Withdrawal

Students may suspend their studies for a period of time by taking a leave of absence. A formal petition must be filed and written approval granted. Leaves of absense for more than two years are not generally granted. Credit earned while on leave of absence is subject to the limitation placed on extramural credit. Students who voluntarily withdraw from the degree program sever all connection with the college and University, and if they subsequently wish to return, they must make a formal application for readmission. Students who fail to register in the first three weeks of the semester, without having received a leave of absence or permission for study in absentia, may be classified, by action of the faculty, as having withdrawn.

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, R. C. Loehr, H. A. Longhouse, D. C. Ludington, W. F. Millier, R. E. Pitt, G. E. Rehkugler, 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, and Thermodynamics)	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 (worth at least 12 credits), chosen from courses 350 to 399 and above 450 but excluding seminars and 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, T. A. Cool, H. H. Fleischmann, M. S. Isaacson, V. O. Kostroun, J. A. Krumhansl, A. F. Kuckes, A. Lewis, R. L. Libott, 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 an engineering distribution course. 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; P. Clancy, 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 biochemical engineering and polymeric materials are available. Students who plan to enter the field program take Chemistry 208 as an approved elective during the freshman year. The program for the last three years, for students who have taken two engineering distribution courses during the first year, is as follows:

Term 3	*Credits*
Math 293, Engineering Mathematics	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 course	3
Term 4	
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 course	3
Term 5	
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 course	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 course	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
Humanities or social sciences course	3
Term 8	
Chem E 462, Chemical Process Synthesis	4
Chem E 671, Process Control	3
Elective*	3
Humanities or social sciences course	3

*The electives in terms five through eight comprise 6 credits of technical electives and 6 credits of free electives.

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; C. A. Shoemaker, associate director

Department of Structural Engineering: P. Gergely, chairman; J. F. Abel, M. D. Grigoriu, K. C. Hover, 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: 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 331, 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

*These courses can also be used to satisfy the Common Curriculum requirements for engineering distribution courses.

†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; normally it 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 ouside of the school.

The School of Civil and Environmental Engineering, in conjunction with the Cornell Graduate School of Management, 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 for this joint program must be submitted at the beginning of the sixth term of study.

Computer Science

O. Babaoğlu, J. Bates, K. Birman, D. Bitton, T. Coleman, R. L. Constable, A. J. Demers, J. R. Gilbert, D. Gries, J. Hartmanis, J. E. Hopcroft, G. Johnson, K. Karplus, A. Moitra, A. Nicolau, G. Salton, F. B. Schneider, D. Skeen, R. Teitelbaum, S. Toueg, C. Van Loan, V. Vazirani

Bachelor of Science Curriculum

The Field Program in Computer Science is intended for students who are interested in the computing process and in the fundamental structure of algorithms, data, and languages that underlie that process. 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 and CS 280 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. Students who have not maintained an average of at least 3.0 in the mathematics courses required by the Common Curriculum are also discouraged from entering the program. Apart from these requisites and those of the college, the courses required for the Field Program in Computer Science are:

Course work	*Credits*
Systems sequence	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	3 or 4
CS 222, Scientific Computation, or	
CS 421, Numerical Solutions of Algebraic Equations	
Electrical Engineering	3
EE 230, Digital Systems*	
Computer science electives	7 or 8
Two nonrequired computer science courses numbered above 410†	
Related electives	14
One mathematically oriented course plus three courses forming a coherent sequence in operations research, electrical engineering, or another technical area	

*EE 230 also counts as an approved elective.
†Except CS 415, CS 600, and seminar courses.

The performance of students in the Field of Computer Science is reviewed each term. To remain in good standing with the department, they must have an overall term average of at least 2.3 with no courses failed and a term average for field-program courses of at least 2.7 with no course grade less than C-, and they must be making satisfactory progress in the field.

Cooperative Program with the Graduate School of Management

Undergraduates majoring in computer science may be interested in a program that can lead, in the course of six years, to B.S., M.Eng.(Computer Science), and M.B.A. degrees. This program, which is sponsored jointly by the College of Engineering and the Graduate School of Management, enables students to study several subjects required for the M.B.A. degree as part of their undergraduate curriculum. Planning must begin early, however, if all requirements are to be completed on schedule.

For further details, application forms, and assistance in planning a curriculum, students should contact the computer science undergraduate coordinator in Upson Hall.

Master of Engineering (Computer Science) Degree Program

The one-year program leading to the degree of M.Eng.(Computer Science) 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 databases 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. Rosson, associate director; T. Berger, R. Bolgiano, Jr., N. H. Bryant, H. J. Carlin, G. C. Dalman, D. F. Delchamps, L. F. Eastman, D. T. Farley, T. L. Fine, J. Frey, T. Hagfors, C. D. Heegard, 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, F. T.-C. Luk, N. C. MacDonald, P. R. McIsaac, J. A. Nation, B. Nichols, C. R. Pollock, C. Pottle, A. P. Reeves, C. E. Seyler, Jr., 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. Wong, 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 I	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; R. W. Allmendinger, W. A. Bassett, J. M. Bird, A. L. Bloom, L. D. Brown, J. L. Cisne, A. K. Gibbs, B. L. Isacks, T. E. Jordan, D. E. Karig, S. Kaufman, 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 Geol 201 (Engr 201) during their freshman or sophomore year. Those interested in geobiology should take Biological Sciences 101-103 and 102-104.

Geological Sciences requires six 300-level courses for the major: Geol 326, 355, 356, 375, 388, and one other 300- or 400-level course. A summer field geology course is also required.

Core courses may be taken in any reasonable sequence, except that Geol 355, which is offered in the fall, should be taken before Geol 356, which is offered in the spring. Geol 326 and 375 should be taken relatively early in the major program as preparation for the summer field camp, which usually follows the junior year. Students with adequate preparation may attend field camp at an earlier time.

It is recommended that students intending to specialize in *geophysics* select most of their approved and technical electives from the following courses or their equivalents:

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

It is recommended that students intending to specialize in *geochemistry* (including petrology and mineralogy) select most of their approved and technical electives from the following courses or their equivalents:

Chem 208, General Chemistry
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

It is recommended that students intending to specialize in *geobiology* select most of their approved and technical electives from the following courses or their equivalents:

Bio S 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

It is recommended that students who want to pursue further training or immediate employment in *applied geology* (environmental and engineering geology, groundwater, petroleum geology, or geological engineering) select most of their approved and technical electives from the following courses or their equivalents, with two of the four from the same field:

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
OR&IE 260, Introductory Engineering Probability
OR&IE 370, Introduction to Statistical Theory with Engineering Applications

Students intending to specialize in *economic geology* or pursue careers in the mining industries or mineral exploration should consider including economics courses among their humanities and social sciences electives and should select most of their approved and technical electives from the groups of courses listed above for geochemistry and applied geology plus the following additional courses:

CEE 654, Aquatic Chemistry
CEE 741, Rock Engineering

Students who want a more general background or who want to remain uncommitted with regard to speciality must choose at least two of their three approved electives from the same field, at a level comparable to the courses listed above. The technical electives may be chosen from offerings in geological sciences or in other science or engineering fields and should be at the 300 level or above. Outstanding students may request substitution of a senior 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, 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, M. O. Thompson

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. A new program also permits a double major in materials science and engineering and electrical engineering. 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, Structural Characterization 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 447, Materials Design Concepts I	1
MS&E 448, Materials Design Concepts II	2
	37

*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.

Students may also obtain a Bachelor of Science degree by completing the Electronic Materials Program, which involves a double major in materials science and engineering and electrical engineering. To enter this program, which is administered by the Department of Materials Science and Engineering, students must complete Engr 210, Introduction to Electrical Systems, and Engr 262, Electrical Properties of Materials, during their sophomore year. In addition to the courses needed to satisfy the requirements of the Common Curriculum, the Electronic Materials Program requires the following:

MS&E 261, Mechanical Properties of Materials
EE 315, Electrical Laboratory I
EE 303, Electromagnetic Theory I
MS&E 331, Structural Characterization and Properties of Materials
MS&E 335, Thermodynamics of Condensed Systems
MS&E 332, Electrical and Magnetic Properties of Materials (or EE 306, Quantum and Solid-State Electronics)
EE 318, Electrical Laboratory II
MS&E 336, Kinetics, Diffusion, and Phase Transformation
EE 435, Semiconductor Electronics
MS&E 441, Microprocessing of Materials
EE 301, Electrical Signals and Systems
MS&E 447, Design Concepts of Materials I
EE 436, Semiconductor Electronics
MS&E 444, Senior Laboratory
MS&E 448, Design Concepts of Materials II

In addition, the Electronic Materials Program requires two electrical engineering electives, which count as free electives in the Common Curriculum

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, composite materials, 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 203 (also T&AM 203). Both of these courses are prerequisites for courses to be taken during the junior year. During either the sophomore or junior year students take Engr 221 (also M&AE 221).

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 eight required courses (beyond Engr 202, 203, and 221, already mentioned), and five elective courses (15 credits). The seven required field courses are:

   Engr 210, Introduction to Electrical Systems
   Engr 261, Introduction to Mechanical Properties of Materials
   M&AE 312, Fundamentals of Manufacturing Processes
   M&AE 323, Introduction to Fluid Mechanics
   M&AE 324, Heat Transfer
   M&AE 325, Mechanical Design and Analysis
   M&AE 326, Systems Dynamics
   M&AE 327, Mechanical Engineering Laboratory

The five elective courses consist of two alternate technical electives (6 credits), one mathematics elective (3 credits), and two field electives (6 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, M&AE 570, and M&AE 575.

The requirements listed are those now in effect for the classes of 1985 and subsequent years and are subject to change by the faculty of the school. Requirements for earlier classes differ somewhat from the ones listed.

Students of the classes of 1986 and earlier have the option of replacing Engr 261 and M&AE 312 with M&AE 311 and one field elective. However, M&AE 311 will be given for the last time during the fall semester of 1984.

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 specialities 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 736, Numerical Fluid Mechanics I	4
M&AE 737, Numerical Fluid Mechanics II	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 include biomechanical engineering, combustion, energy and power systems, fluid mechanics, heat transfer, materials and manufacturing engineering, mechanical systems and design, and CAD/CAM (computer-aided design/computer-aided manufacturing). An individual student's curriculum includes a 4-credit design course, a major consisting of a minimum of 12 credits, and sufficient technical electives to meet the degree requirement of 30 credits. 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 to the M.Eng.(Nuclear) degree is intended primarily for individuals who want a terminal professional degree, but it may also serve as preparation for doctoral study in nuclear science and engineering. The course of study covers the basic principles of nuclear reactor systems with a major emphasis on reactor safety and radiation protection and control. The special facilities of the Ward Laboratory of Nuclear Engineering are described in the *Announcement of the Graduate School.*

The interdisciplinary nature of nuclear engineering allows students to enter from a variety of undergraduate specializations. The recommended background is (1) an accredited baccalaureate degree in engineering, physics, or applied science; (2) physics, including atomic and nuclear physics; (3) mathematics, including advanced calculus; and (4) thermodynamics. Students should see that they fulfill these requirements before beginning the program. In some cases, deficiencies in preparatory work may be made up by informal study during the preceding summer. General admission and degree requirements are described in the college's introductory section.

The following courses are included in the 30-credit program:

Fall term
A&EP 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; M. J. Todd, acting director, 1984–85; R. E. Bechhofer, L. J. Billera, R. G. Bland, D. C. Heath, P. L. Jackson, W. L. Maxwell, J. A. Muckstadt, G. L. Nemhauser, N. U. Prabhu, R. Roundy, T. J. Santner, L. W. Schruben, M. S. Taqqu, H. M. Taylor 3d, 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
Course in humanities and social sciences	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
Course in humanities and social sciences	3

*If CS 211 has already been taken, an appropriate 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 Graduate School of Management (GSM) NCC 504 (offered only in the fall), which is recommended for those contemplating the pursuit of a graduate business degree; and Industrial and Labor Relations 120, 121, 151, and 320. The adviser must approve the selection in all cases.

The basic senior-year program, from which individualized programs are developed, consists of the following courses:

	Minimum credits
OR&IE 580, Digital Systems Simulation	4
Three upperclass OR&IE electives as described below	9
Two technical electives	6
Two courses in humanities and social sciences	6
Two free electives	6

Available OR&IE electives are as follows:

Industrial systems: OR&IE 417, 421,* 562, and GSM NBA 641
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 Management 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 conclusion of each term.

Master of Engineering (OR&IE) Degree Program

This one-year professional degree program stresses applications of operations research and industrial engineering and requires completion of a project. The course work centers on additional study of analytical techniques, with particular emphasis on engineering applications, especially in the design of new or improved man-machine systems, information systems, and control systems.

General admission and degree requirements are described in the introductory "Degree Programs" section. The M.Eng.(OR&IE) program is integrated with the undergraduate Field Program in Operations Research and 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 894, Applied OR&IE Colloquium	1
OR&IE 599, Project	minimum of 4
Three technical electives	9

The electives specified above will normally be chosen from graduate courses offered by the School of Operations Research and Industrial Engineering. A minimum of 30 credits must be taken to complete the program.

II. For matriculants from other fields who minimally fulfill the prerequisite requirements: (Students who have the equivalent of OR&IE 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	4
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	4
OR&IE 894, Applied OR&IE Colloquium	1
OR&IE 599, Project	minimum of 4
Two technical electives	6

Students fulfill the project requirement by working as part of a group of no more than four students on an operational systems problem that actually exists in some organization. Appropriate problems are suggested by manufacturing firms, retailing organizations, service organizations, government agencies, and educational institutions.

Cooperative Program with the Cornell Graduate School of Management

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 these systems.) An early start on meeting the business-degree requirements permits students accepted into the cooperative program to earn both the M.Eng.(OR&IE) and M.B.A. degrees in two years rather than the three years such a program would normally take.

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 GSM NCC 511, 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 Management.

3) During the sixth year, over a period of two semesters, the candidate earns 26 credits in elective courses approved by the management school, plus 4 credits for GSM NCC 511, Business Policy. (The requirement for NCC 511 has been waived for the 1984-85 academic year.)

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, F. Santosa

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

100 Introduction to Computer Programming (also CS 100) Fall, spring, summer. 4 credits. The course content is the same as that of CS 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 Pascal. The course does not presume previous programming experience. An introduction to numerical computing is included, although no college-level mathematics is presumed. Programming assignments are tested and run on interactive, stand-alone microcomputers.

102 Drawing and Engineering Design (also M&AE 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.
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).

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, desalinization 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. 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. Ingraffea, 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 in 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. 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.

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.

121 Fission, Fusion, and Radiation (also NS&E 121) Spring. 3 credits.
2 lecs, 1 lab demonstration.
A lecture, demonstration, and laboratory course on: (1) the physical nature and biological effects of nuclear radiation; (2) the benefits and hazards of nuclear energy; (3) light-water reactors, breeder reactors, and fusion reactors; and (4) the uses of nuclear radiation in physical and biological research. The laboratory work and demonstrations involve criticality and the control of Cornell's two research reactors, detection of and protection against nuclear radiation, neutron activation analysis using gamma-ray spectroscopy, and plasma sources and devices.

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.

201 Introduction to the Physics and Chemistry of the Earth (also Geol 201) Spring. 3 credits. Prerequisites: Mathematics 191 or 193, Physics 112, and Chemistry 207.
2 lecs; 1 rec, lab, or field trip. D. L. Turcotte, J. M. Bird.
Formation of the solar system, accretion and evolution of the earth, radioactive isotopes and the geological time scale, rocks and minerals, the continents and the oceans, erosion and sedimentation, weathering processes, the earth as a heat engine, volcanism, seismology, gravity, magnetism, plate tectonics, deformation of the earth's crust, comparative planetology.

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 EE 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, 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, and introduction to data structures and analysis of algorithms. PL/1 will be the principal programming language used in the fall 1984 semester; Pascal will be used in subsequent semesters.

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, multiphase pure substances, gaseous reactions. Heat-engine and heat-pump cycles, with an introduction to energy-conversion systems.

222 Introduction to Scientific Computation (also CS 222) Spring. 3 credits. Prerequisites: CS 100 and Mathematics 112, 122, or 192.
2 lecs, 3 evening exams.
Students write FORTRAN programs to solve representative problems from elementary calculus. Emphasis is on the design of numerical software that is efficient, reliable, stable, and portable. Special topics include supercomputing and parallel computation.

241 Engineering Computation (also CEE 241) Fall, spring. 3 credits. Prerequisites: CS 100, Mathematics 293. Corequisite: Mathematics 294. Introduction to numerical methods for solving engineering problems. Development of FORTRAN programming proficiency. Numerical solutions and finite-difference calculus, including Taylor-series approximations, roots of functions, least-squares curve fitting, numerical integration, solution of ordinary differential equations and simultaneous linear equations. Application to problems from many areas of engineering.

260 Introductory Engineering Probability (also OR&IE 260) Fall, spring. 3 credits. Prerequisite: first-year calculus.
3 lecs.
The basic tools of probability and their use in engineering. 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 lecs, 1 rec or lab.
The relation of elastic deformation, plastic deformation, and fracture properties to structure and defects on a microscopic scale in metals, ceramics, polymers, and composite materials. Design and processing of materials to achieve high modulus, damping capacity, hardness, fracture strength, creep resistance, or fatigue resistance. Flaw-tolerant design methods using fracture mechanics.

262 Introduction to Electrical Properties of Materials Spring. 3 credits.
2 lecs, 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.

264 Computerized-Instrumentation Design (also A&EP 264) Fall, spring. 3 credits. Prerequisites: Engr 100 or CS 100, and Physics 213, or the equivalent.
1 lec, 1 lab. A. F. Kuckes.
Design techniques for incorporating small computers into experimental apparatus. Experiments in elementary physics are performed with appropriate sensors wired to computer interfaces, under program control that employs routines written in BASIC and ASSEMBLY languages. Analog-to-digital converters, digital-to-analog converters, optical encoders, and stepping motors are used. Graphic display of data and theoretical fit are emphasized.

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.
2 lecs.
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.

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 lecs, 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 lecs. 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.

264 Computerized-Instrumentation Design (also Engr 264) Fall, spring. 3 credits. Prerequisites: Engr 100 or CS 100, and Physics 213 or the equivalent.
1 lec, 1 lab. A. F. Kuckes.
Design techniques for incorporating small computers into experimental apparatus. Experiments in elementary physics are performed with appropriate sensors wired to computer interfaces, under program control that employs routines written in BASIC and ASSEMBLY languages. Analog-to-digital converters, digital-to-analog converters, optical encoders, and stepping motors are used. 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 lecs. D. A. Hammer.
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 lecs. 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 lecs, 1 rec. H. H. Fleischmann.
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 lecs, 1 rec. J. Silcox.
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 lecs, 1 rec. J. Silcox.
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 lecs, 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, oscillators 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 meduim-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 1984-85.
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, Bernouli's equation, vorticity and circulation, lift; viscous incompressible flow and the Navier-Stokes equations, Reynolds number, Poiseuille flow in a pipe, Stokes drag on a sphere; boundary layers, Blasius equations; flow instabilities, Rayleigh-Benard convection and the onset of chaotic flow. Introduction to turbulent flow.

490 Informal Study in Engineering Physics Credit to be arranged.
Laboratory or theoretical work in any branch of engineering physics under the direction of a member of the staff. The study can take a number for forms; for example, design of laboratory apparatus, performance of laboratory measurements, or theoretical design or analysis.

[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. Not offered 1984-85.
Staff.
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 or 356 or equivalent. Open to fourth-year students with permission of instructor.
3 lecs. J. A. Nation.
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. V. Lovelace.
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.

608 Plasma Astrophysics (also Astronomy 660) Spring. 2 credits.
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. D. D. Clark.
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. Not offered 1984-85.
Staff.
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 1984-85.
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 1984-85.
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: a course in quantum mechanics or permission of instructor. Intended for advanced undergraduates or graduate students. Offered alternate years.
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. Offered alternate years. Analysis of various technological and engineering problems in design and construction of fusion reactors. Topics include basic reactor schemes, materials, mechanical and heat-transfer problems, radiation and safety, superconducting magnets, energy conversion, plasma impurities, and economics.

638 Intense Pulsed Electron and Ion Beams: Physics and Technology Spring. 2 credits. Prerequisites: EE 581 or 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.
D. D. Clark.
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. D. D. Clark.
Laboratory experiments and experimental methods in nuclear physics and reactor physics. Ten experiments are available, some using the Zero Power Reactor critical facility.

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 charcterizing 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.
Several laboratory field trips. 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.

753 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.

761 Kinetic Theory (also EE 681) Fall. 3 credits. Prerequisite: EE 407, Physics 561, or permission of instructor. Offered alternate years.
2 lecs. R. L. Liboff.
For course description, see EE 681.

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. 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. J. Zollweg.
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 equilbria.

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, multicomponent, and extractive distillation; liquid-liquid extraction; gas absorption; crystallization.

432 Chemical Engineering Laboratory Fall. 3 credits. Prerequisites: Chem E 430 and 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 variable. 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.
J. C. Smith.
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.
The latest computing techniques for solving current problems in chemical engineering are evaluated. Major topics are process simulation, real-time computing, interactive computer graphics, and CAD/CAM. 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 Multiphase 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. Prerequisites: 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 595, fall; 596, spring. Credit variable. Research or studies on special problems in chemical engineering.

611 Phase Equilibria Fall, spring. 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. Not offered 1984-85.
3 lecs. H. F. Wiegandt.
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 Spring. 3 credits Prerequisite: Chem E 640 or equivalent. Offered alternate years.
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. D. S. Clark, 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 Summer. 3 credits. Prerequisite: Microbiology 291 or equivalent.
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, and 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 Polymers in Electronics and Related Areas Spring. 3 credits. Prerequisite: 640 or permission of instructor.
3 lecs. F. Rodriguez.
Applications of polymers as resists for microlithography, as insulators, and as conductors. Radiation effects, polymer synthesis, and surface characterization. Additional special topics may be covered.

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. P. Harriott.
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.
D. S. Clark.
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.

741 Advanced Concepts in Biochemical Engineering Fall, spring. 1 credit per term. Prerequisite: Chem E 644 or permission of instructor.
D. S. Clark, R. K. Finn, M. L. Shuler.
Discussion of current topics and research in biochemical engineering for graduate students.

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 Fall. 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.

[774 Computer Modeling of Materials Spring. 3 credits. Offered alternate years. Not offered 1984-85.
3 lecs.
Computer simulation of molecular models of materials.]

790 Seminar Fall, 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. Structural engineering faculty.
For description see Engineering Common Courses.

241 Engineering Computation (also Engr 241) Fall, spring. 3 credits. Prerequisites: CS 100 and Mathematics 293. Corequisite: Mathematics 294.
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.
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.

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.

701 Environmental Engineering Department Seminar Fall, 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 1984-85.
2 lecs, 1 lab. Staff.
Physical environmental factors affecting engineering planning decisions: climate, soil, and rock conditions, water sources. Evaluation methods: interpretation of meteorological, topographic, geologic, and soil maps, aerial photographs, and subsurface exploration records.]

613 Image Analysis I: Landforms Fall. 3 credits. Prerequisite: permission of instructor.
2 lecs, 1 lab. Staff.
Analysis and interpretation of aerial photographs for a broad spectrum of soil, rock, and drainage conditions. Specific fields of application are emphasized.

614 Image Analysis II: Physical Environments Fall. 3 credits. Prerequisite: CEE 612 or 613.
2 lecs, 1 lab. Staff.
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.

810 Thesis—Remote Sensing Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term.
A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

Public and Environmental Systems Engineering

321 Microeconomic Analysis (also Economics 313, section 5) Fall. 4 credits. Prerequisite: one semester of calculus. A social science elective for engineering students.
R. E. Schuler.
Intermediate microeconomic analysis similar to Economics 311 but emphasizing mathematical techniques and engineering-design implications. Theory of consumer choice and efficient production, analysis of monopoly and competitive markets, theories of distribution, market equilibrium and welfare economics.

322 Economic Analysis of Government (also Economics 308) Spring. 4 credits. Prerequisites: one semester of calculus, plus CEE 321 or Economics 313. A social science elective for engineering students.
R. E. Schuler.
Analysis of government intervention in a market economy and implications for engineering planning and design. Market imperfections, public goods, public finance, cost-benefit analysis, environmental regulation, 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. Not open to freshmen. A social science elective for engineering students. Not offered 1984-85.
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 1984-85.
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 undergaduates. Not offered 1984-85.
Staff.
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.
P. Clermont.
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. Not offered 1984-85.
N. Orloff, R. Booth.
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, S. Jasanoff.
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 environmental problems. Deterministic and stochastic applications to problems of water quality, energy production, and facility location.

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 sytems, 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 recs, 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 1984-85
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. Staff.
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.

632 Analytical Hydrology Fall. 3 credits. Prerequisite: CEE 331.
W. H. Brutsaert.
Physical and statistical prediction methods for design related to hydrologic processes. Hydrometeorology and evaporation. Infiltration and base flow. Surface runoff and channel routing. Linear and nonlinear hydrologic systems. Storage routing and unit hydrograph methods.

633 Flow in Porous Media and Groundwater Spring. 3 credits. Prerequisite: CEE 331.
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.
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.
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. Not offered 1984-85.
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.
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.
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.
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.
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. Not offered 1984-85.
2 lecs, 1 lab. L. H. Irwin.
For description see Ag En 491.]

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.
3 lecs, 1 lab. L. H. Irwin.
For description see Ag En 692.

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.

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.
T. D. O'Rourke.
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 1984-85.
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 potential. Design examples.

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 1984-85.
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 1984-85.
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. Quality parameters, criteria and standards for water and wastewater. Emphasis on water-quality control concepts, theory, and methods. Elementary analysis pertaining to the modeling of pollutant reactions in natural systems, and introduction to design of unit processes for water and wastewater treatment.

352 Water Supply Engineering Fall. 3 credits. Prerequisite: CEE 351 or permission of instructor.
3 lecs. R. I. Dick.
Analysis of contemporary threats to human health 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.
Staff.
Microbiological phenomena pertinent to analysis of natural systems and design of engineered microbial processes in pollution control.

652 Assimilation of Pollutants in Natural Systems Fall. 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. L. W. Lion.
Principles of chemistry applicable to the understanding, design, and control of water and wastewater treatment processes and to reactions in receiving waters.

654 Aquatic Chemistry Spring. 3 credits. Prerequisite: CEE 653 or Chemistry 287-288.
3 lecs. J. J. Bisogni.
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. May not be offered 1984-85.
3 lec-discs. Staff.
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 1984-85
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 Spring. 1 credit. Open to undergraduates with permission of instructor.
R. I. Dick.
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.
Staff.
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. Staff.
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, 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. 3 credits.
A. H. Meyburg.
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.

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 323, OR&IE 320, or permission of instructor. Recommended: CEE 361.
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 Fall. 3 credits
Recommended: CEE 361 or 660, or permission of instructor.
G. P. Fisher.
Financing and organization of mass trasportation. 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 660. Not offered 1984-85.
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. J. F. Abel.
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.
W. McGuire.
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 Design of Concrete Structures Fall. 4 credits. Prerequisites: CEE 372 or permission of instructor. Prerequisites or corequisites: CEE 376 and Engr 261.
Evening exams, design project. Staff.
Behavior and design of reinforced concrete, prestressed concrete, and composite structures.

374 Design of Steel Structures Spring. 4 credits. Prerequisite: CEE 373 or permission of instructor. Prerequisites or corequisites: CEE 376 and Engr 261.
Evening exams, design project. Staff.
Behavior and design of steel structures. Introduction to the plastic analysis of frames.

[375 Structural Behavior Laboratory Spring 2 credits. Prerequisite or corequisite: CEE 372. Not offered 1984-85.
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, beams on elastic foundation, finite-difference method, introduction finite-element method.

673 Advanced Structural Analysis Fall. 3 credits. Prerequisites; CEE 372 and computer programming.
J. F. Abel.
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 1984-85.
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 376 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.

678 Low-Cost Housing Primarily for Developing Countries Fall. 3 credits.
2 lecs, conferences. F. O. Slate.
A broad, multidisciplinary approach covering technology, architecture, planning, sociology, economy, and cultural aspects. Students work in teams on a term project, applying their own discipline while being introduced to the problems and approaches of other disciplines. For example, engineering students investigate the technological aspects of the subject but also learn about other matters that influence technological decisions, such as cultural and economic factors.

680 Structural Engineering Seminar Fall, spring. 1 credit. Limited to qualified seniors and graduate students.
Staff.
Presentation of topics of current interest in the field of structures.

770 Engineering Fracture Mechanics Fall. 3 credits. Prerequisite: CEE 772 or permission of instructor. Offered alternate years.
2 lecs, 1 lab. A. R. Ingraffea.
Fundamentals of fracture-mechanics theory. Energy and stress-intensity approaches to fracture. Mixed-mode facture. 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.
A. R. Ingraffea.
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.
M. D. Grigoriu.
Review of probability theory, practical measures for structural reliability, second-moment reliability indices, probability models for strength and loads, probability-based design codes, reliability of structural systems, imperfection-sensitive structures, fatigue, stochastic finite-element techniques.

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, and design to resist nonductile types of failure.

777 Advanced Behavior of Metal Structures Spring. 3 credits Prerequisite: CEE 373.
W. McGuire.
Behavior and design of tall-building systems. Plate girders. Cold-formed steel.

[778 Shell Theory and Design Spring 3 credits. Offered alternate years. Not offered 1984-85.
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 Dynamics and Earthquake Engineering 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 1984-85.
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 1984-85.
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: CEE 772. Offered alternate years. Not offered 1984-85.
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, 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 nonengineering students but open to qualified upperclass students. Prerequisite: premission 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.
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: CEE 323 or equivalent.
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 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 Water-Resources Systems II Spring. 3 credits. Prerequisites: CEE 304 and 694 or permission of instructor.
J. R. Stedinger, D. P. Loucks.
Advanced topics in the development and use of optimization and simulation models for water-resources planning. Stochastic hydrologic modeling and stochastic river-basin and reservoir models.

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 100) Fall, spring, summer. 4 credits. Students who plan to take CS 101 or 102 and also 100 must take 101 or 102 first.
2 lecs, 1 rec (optional). 3 evening exams.
An introduction to elementary computer programming concepts. Emphasis is on techniques of problem analysis and algorithm and program development. The subject of the course is programming, not a particular programming language. The principal programming language used is Pascal. The course does not presume previous programming experience. An introduction to numerical computing is included, although no college-level mathematics is presumed. Programming assignments are tested and run on interactive, stand-alone microcomputers.

101 The Computer Age 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 Pascal 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.

102 Introduction to Microprocessor Use Fall. 3 credits. Not open to engineering students.
2 lecs, 1 rec. 1 evening exam.
An introduction to the non-programming use of a modern microprocessor. The course will attempt to assess and demonstrate the capabilities and limitations of the current generation of personal computers. It will explore the potential for application development using database, spreadsheet, and text-processing packages. Little conventional programming will be involved, but laboratory work, using either the Apple Macintosh or the IBM PC, is required.

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 used in the fall 1984 semester; Pascal will be used in subsequent semesters.

222 Introduction to Scientific Computation (also Engr 222) Spring. 3 credits. Prerequisites: CS 100 and Mathematics 112, 122, or 192.
2 lecs. 3 evening exams.
Students write FORTRAN programs to solve representative problems from elementary calculus. Emphasis is on the design of numerical software that is efficient, reliable, stable, and portable. Special topics include supercomputing and parallel computation.

280 Discrete Structures 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. Not offered 1984-85.
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 Fall, summer. 4 credits. Prerequisite: CS 211 or equivalent.
2 lecs, 1 sec. 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.

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, emphasizing abstract data types. Dynamic storage allocation and memory management. Detailed study of searching and sorting methods. Analysis to determine the more efficient algorithm in a given situation.

411 Programming Languages and Logics Spring. 4 credits. Prerequisites: CS 410 and permission of instructor. Enrollment limited.
2 lecs.
Introduction to major styles of programming language, with emphasis on program explanations and logics of programming. Some study of language implementations. Topics include ways of defining languages (syntax, semantics), descriptive languages (pure Lisp), imperative languages (full Lisp, Pascal), languages with assertive modes of expression (programming logics). One medium-sized project is assigned in Lisp; the machine is used for the project and for a variety of small assignments in programming and proving.

[412 Introduction to Compilers and Translators Fall. 4 credits. Prerequisite: CS 314. Prerequisite or corequisite: CS 481. Offered alternate years. Not offered 1984-85.
3 lecs.
Overview of the internal structure of modern compilers, with emphasis on implementation techniques. Topics covered will include lexical scanning, simple parsing techniques, symbol-table manipulation, type-checking routines, and code generation for a small abstract machine. The course will entail a compiler implementation project.]

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. Prerequisites: CS 314 and permission of instructor. Not offered 1984-85.
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.]

421 Numerical Solution of Algebraic Equations Fall. 4 credits. Prerequisites: Mathematics 222 or 294, one additional mathematics course numbered 300 or above, and knowledge of FORTRAN at the CS 222 level.
3 lecs.
Modern algorithms for systems of linear and nonlinear equations and multidimensional optimization. Emphasis is on stable and efficient methods. Students will analyze such methods with the aid of linear algebra and multivariable calculus and gain experience with state-of-the-art software packages. Students wishing to learn about the numerical solution of differential equations are advised to take Mathematics 425, a natural spring-term sequel to CS 421.

432 Introduction to Database Systems Spring. 4 credits. Prerequisite: CS 211 or permission of instructor.
2 lecs, 1 rec.
Introduction to modern database management systems. Concepts in data modeling and query processing. Database models and query languages. Storage structures and access methods. Concurrency control.

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 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, Mathematics 332 or 432, or permission of instructor. Not offered every year. Not offered 1984-85.
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 1984-85.
3 lecs.]

621 Matrix Computations Fall. 4 credits. Prerequisites: CS 421 and Mathematics 411 and 431, or permission of instructor.
3 lecs.
Numerical matrix algorithms. Stable and efficient methods for solving systems of linear equations: Gaussian elimination, Cholesky decomposition, bounded and structured systems, the QR factorization, and least-squares methods. The symmetric and unsymmetric eigenvalue problems and related computational problems. The singular value decomposition.

622 Numerical Optimization and Nonlinear Algebraic Equations Spring 4 credits
3 lecs.
Modern algorithms for the numerical solution of multidimensional optimization problems and simultaneous nonlinear algebraic equations. Emphasis is on efficient, stable, and reliable numerical techniques with strong global convergence properties: quasi-Newton methods, modified Newton algorithms, and trust-region procedures. Special topics may include large-scale optimization, quadratic programming, and numerical approximation.

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.
Modern methods for natural language text processing. Topics include text analysis, storage and retrieval, automatic spelling aids, text compression and encryption, language understanding systems, automatic abstracting, and text generation and translation.

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. Not offered 1984-85.
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.]

661 Robotics Fall. 4 credits. Prerequisites: CS 611 and 681, or permission of instructor.
3 lecs.
Topics include homogeneous coordinates, manipulator movement, geometrical modeling, motion planning, compliance, computer vision, language issues, task planning, and pertinent mathematics.

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.

714 Distributed Computing Spring. 4 credits. Prerequisites: CS 414 and an advanced systems course such as CS 613, 614, 632, or 643.
2 lecs.
Principles of distributed computing and their application to fundamental problems such as deadlock detection. Considerable time will be devoted to modeling distributed computations, the theory of concurrency control, security and protection, and issues in fault tolerance (including consensus problems). Other topics may be optimal resource placement, cache management, the specification of distributed programs, and randomized protocols.

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. 1-4 credits. Prerequisite: permission of instructor. S-U grades only.

[733 Topics in Information Processing Not offered 1984-85.
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 1984-85.]

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 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.

230 Introduction to Digital Systems Fall, spring. 3 credits.
2 lecs, 5 lab experiments.
Introduction to basic analysis, design techniques, and methodology of digital 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, register transfer systems, and Von Neumann machines. A simple processor 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.
Linear-time-invariant (LTI) systems and complex exponential signals, steady-state analysis of active and passive circuits, impulse response, natural modes, convolution, Laplace Transform and general LTI system response, state-space analysis of LTI systems.

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 213 and 214, 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 Schroedinger's equation. Topics include the formalism and methods of quantum mechanics, the hydrogen atom, the structure of simple solids, energy bands, Fermi-Dirac statistics, and the basic physics of semiconductors. Applications studied include a simple metal, thermionic emission, and the p-n junction.

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.

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. 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 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). Prerequisites: EE 302 and 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 Circuit Theory and Applications Spring 4 credits. Prerequisite: EE 302 or equivalent.
3 lecs.
Introduction to scattering formalism. Properties of analog and discrete-time transducers in frequency domain. Realizability of system functions. Synthesis of analog transducers. Maximally flat, Chebyshev, and elliptic transfer functions. Filters. Applications to lumped, discrete-time, and microwave circuits.

[428 Analog and Discrete-Time Circuit Applications Spring. 4 credits. Prerequisite: EE 423, 427, or equivalent. Not offered 1984-85.
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&AM 666) Spring. 3 credits.
3 lecs, biweekly lab.
For description see T&AM 666.

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.
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* (4th 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. Fluctuation-dissipation theorem. Quantum and classical statistics. Black-body radiation. Thermal properties of solids. Kramers-Kronig relation. 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. Fulfills electrical engineering laboratory requirement. Not offered 1984-85.
2 lecs, 1 lab, field trips. C. B. Wharton.
Theory and practice of generation, control, and 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-wave propagation and scattering. Microwave and optical radiation. Intense particle beams. Methods for data collection and analysis.]

484 Introduction to Controlled Fusion: Principles and Technology (also M&AE 559 and NS&E 484) Spring. 3 credits. Prerequisites: EE 301 and 303, or permission of instructor. Intended for seniors and graduate students.
3 lecs. D. A. Hammer.
Introduction to the physical principles and technology underlying controlled fusion power. Topics include fundamental aspects of the physics of ionized gases at high temperature (thermonuclear plasmas), requirements (in principle) for achievement of net power from fusion, technological problems of an actual fusion reactor, and progress of the fusion program toward overcoming these problems. Both magnetic and inertial confinement fusion are discussed, and comparisons are made between fusion and fission.

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 figure; 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, IMPATT diodes; transferred electron (Gunn) 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 *VLSI Technology,* edited by S. M. Sze.

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. Prerequisite: EE 476 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 with permission 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. At the level of *Plasma Physics for Nuclear Fusion*, by Miyamoto.

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. At the level of *Basic Principles of Plasma Physics*, by Ichimaru.

583 Electrodynamics Fall. 4 credits. Prerequisite: EE 304 or equivalent.
3 lecs.
Maxwell's equations, electromagnetic 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 Solar Terrestrial Physics I and II 585, fall; 586, spring. 3 credits each term. Not offered 1984-85.
3 lecs.
Physical processes in the earth's ionosphere and magnetosphere, the sun, 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; basic structure of the sun and solar corona; the solar wind and its 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.
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; Alfven, 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. Offered alternate years.
The theory of ideal and nonideal magnetohydrodynamical equations with emphasis on application to controlled thermonuclear fusion. Topics: derivation and domain of applicability; invariants; waves, equilibrium and normal-mode stability analysis; continuous spectrum; energy principle and applications to confinement geometries; nonideal effects, resistivity, finite Larmor radius stabilization. Selected additional topics such as dynamo theory or MHD turbulence.

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.

630 LSI Testing Spring. 1 or 2 credits. Prerequisite: EE 639.
The projects designed in EE 639 will be tested for functionality and performance. A final design report is required.

[633 Opto-Electronic Devices Fall. 4 credits. Prerequisites: EE 304 and 435 or equivalent. Not offered 1984-85.
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 1984-85.
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.
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.
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. Not offered 1984-85.
J. Frey.
Materials and device problems to be considered in the design and fabrication of VLSI circuits. High-field electron and hole transport; nonequilibrated 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 476 or equivalent.
Custom VLSI design as seen by a system designer. Switches as logic devices, MOS logic design, two-phase clocking, stick diagrams, cell layout, regular control structures, simulation, performance analysis, RC timing model, system design for performance, design for testing, semicustom design, systolic arrays. A chip-design project and design report are required. CAD tools are used extensively.

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, 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.

682 Nonlinear Phenomena in Plasma Physics Spring. 3 credits. Prerequisite: EE 582.
Single-particle motion, multiple-time-scale analysis and ponderomotive effects, weakly nonlinear waves and solitons, nonlinear Vlasov phenomena, quasilinear theory, resonance broadening and resonant mode-mode coupling, statistical theories of plasma turbulence, recent developments in stochasticity and chaos in plasma physics.

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 Fall, spring. 3 credits.
2 lecs, 1 lab, field trips. Evening exams in the fall term. Fall, W. B. Travers; spring, A. L. Bloom.
In order to better harmonize human endeavor with the natural earth we need to know what is natural *on* earth. This course teaches observation and understanding of landscape including coasts, rivers, valleys, and glaciated regions; the genesis of earthquakes, volcanoes, and mountains; evidence for the drifting of continents and its consequences; and the origin, discovery, and development of mineral and water resources. The lab teaches use of topographic and geologic maps and recognition of minerals and rocks and includes field trips to Cascadilla Gorge, Fall Creek, and Enfield Glen.

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.

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 Geol 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.

201 Introduction to the Physics and Chemistry of the Earth (also Engr 201) Spring. 3 credits. Prerequisites: Mathematics 191 or 193, Physics 112, and Chemistry 207.
2 lecs; 1 rec, lab, or field trip. D. L. Turcotte, J. M. Bird.
Formation of the solar system, accretion and evolution of the earth, radioactive isotopes and the geological time scale, rocks and minerals, the continents and the oceans, erosion and sedimentation, weathering processes, the earth as a heat engine, volcanism, seismology, gravity, magnetism, plate tectonics, deformation of the earth's crust, comparative planetology.

210 Introduction to Field 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 introduced to the field methods used in the construction of geologic maps and cross sections and to systematic description of stratigraphic sections. Field and laboratory sessions are held on Saturday mornings until Thanksgiving. All work will be done in the Ithaca area with the exception of one more-distant weekend field trip.

[212 Intersession Field Trip January intersession. 1 credit. Prerequisites: Geol 101 or 201 or equivalent and permission of instructor. Travel and subsistence expenses to be announced. Not offered 1984-85.
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.]

214 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.

[262 Mineral and Energy Resources and the Environment Spring. 3 credits. No prerequisites. Offered alternate years. Not offered 1984-85.
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 326, 355, 356, 375, and 388 may be taken by those who have successfully completed Geol 201 or the equivalent or who can demonstrate to the instructor that they have adequate preparation in mathematics, physics, chemistry, biology, or engineering.

326 Structural Geology Spring. 4 credits. Prerequisite: Geol 101, 201, or permission of instructor.
3 lecs, 1 lab, field trip(s). W. B. Travers, R. W. Allmendinger.
Nature and origin of deformed rocks at microscopic to macroscopic scales, with emphasis on structural geometry and kinematics.

345 Geomorphology Spring. 4 credits. Prerequisite: Geol 102, 201, 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, 201, 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.

375 Sedimentology and Stratigraphy Fall. 4 credits. Recommended: Geol 102 or 201.
2 lecs, 2 labs, field trips. J. L. Cisne, T. E. Jordan.
Formation of sedimentary rocks. Depositional processes. Depositional environments and their recognition in the stratigraphic record. Correlation of strata in relation to time and environment. Seismic stratigraphy. Geological age determination. Reconstruction of paleogeography and interpretation of earth history from stratigraphic evidence.

388 Geophysics and Geotectonics Spring. 4 credits. Prerequisites: Mathematics 192 and Physics 213 or equivalent.
3 lecs, 1 lab. B. L. Isacks.
Global tectonics and the deep structure of the solid earth as revealed by investigations of earthquakes, earthquake waves, the earth's gravitational and magnetic fields, and heat flow.

410 Field Geology Summer. 6 credits. Prerequisites: Geol 326 or permission of instructor. Six weeks at the Sierra Madre Field Camp, Wyoming. Fee, $1650.
W. B. Travers and staff.
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.

412 Experiments and Techniques in Earth Sciences Spring. 2 credits. Prerequisites: Physics 213 and Mathematics 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.

[414 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 1984-85.
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.]

424 Petroleum Geology Spring. 3 credits. Recommended: Geol 326.
2 lecs, 1 lab. W. B. Travers.
Introduction to hydrocarbon exploration and development. Exploration techniques, including geologic use of well logs, fluid pressures, seismic-reflection methods, gravity, and magnetic measurements to map subsurface structures and stratigraphy. Petroleum origin and migration. Dispersal systems and depositional patterns of petroleum reservoirs. Economics of exploration, leasing, drilling and production, and estimates of petroleum reserves.

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 versus continental crust. Origin and evolution of oceanic and continental crust.

[432 Digital Processing and Analysis of Geophysical Data Spring. 3 credits. Prerequisites: Geol 487 or equivalent. Offered alternate years. Not offered 1984-85.
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.]

434 Interpretation of Seismic Reflection Data Spring. 3 credits. Prerequisite: Geol 487 or equivalent. Offered alternate years.
2 lecs, 1 lab. L. D. Brown.
Techniques for inferring geologic structure and lithology 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.

[442 Glacial and Quaternary Geology Spring. 3 credits. Prerequisite: Geol 345 or permission of instructor. Not offered 1984-85.
2 lecs, 1 lab; several Saturday field trips.
A. L. Bloom.
Glacial processes and deposits and the stratigraphy of the Quaternary.]

[453 Modern Petrology Fall. 3 credits. Prerequisite: Geol 356. Offered alternate years. Not offered 1984-85.
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 356 or equivalent.
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 ^{14}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 356 or equivalent. Not offered 1984-85.
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 heterogenoeous 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. 3 credits Prerequisite: Geol 461 or permission of instructor. Offered alternate years.
3 lecs, field trip. A. K. Gibbs.
Exploration geochemistry, geophysics, and geology; design of exploration programs; topics in economic geology.

472 Paleobiology Spring. 3 credits. Prerequisites: Biological Sciences 101-102 and 103-104 or equivalent, and either Geol 375, Biological Sciences 212 or 274, or permission of instructor.
3 lecs. 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.

[474 Modern Depositional Systems Spring. 3 credits. Prerequisite: Geol 375 or permission of instructor. Offered alternate years. Not offered 1984-85.
3 lecs. T. E. Jordan.
Compositions, textures, sedimentary structures, and facies variations of sediments in modern depositional environments. Clastic and carbonate environments; fluvial, alluvial-fan, delta, intertidal, submarine-fan, carbonate-bank, and sabkha systems.]

476 Sedimentary Basins: Tectonics and Mechanics Spring. 3 credits. Prerequisite: Geol 375 or permission of instructor.
3 lecs. T. E. Jordan.
Subsidence pf sedimentary basins from the point of view of plate tectonics and geomechanics. Interactions of subsidence, sediment supply, and environmental characteristics in development of stratigraphic sequences. Framework of deep oceans; active-margin, passive-margin, and cratonic basins; and stratigraphy. Topics include sedimentary petrology, geophysical modeling, and the role of sea-level fluctuations. Modern and ancient examples.

487 Geophysical Prospecting Fall. 3 credits. Prerequisites: Physics 213 and Mathematics 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. Prerequisites: Geol 101 or 201, Mathematics 192, Physics 213, or permission of instructor. Offered alternate years.
3 lecs. 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 director of undergraduate studies during the junior year. Participation requires acceptance of a thesis proposal by the faculty committee.

600–699 Seminars and Special Work Fall, spring. 1-3 credits, variable each term. Prerequisite: permission of instructor.
Advanced work on original investigations in geological sciences. Topics change from term to term.

621 Tectonic and Stratigraphic Evolution of Sedimentary Basins
W. B. Travers.

623 Marine Geology
D. E. Karig.

625 Rock and Sediment Deformation
D. E. Karig.

631 Plate Tectonics and Geology
J. M. Bird.

641 Advanced Geomorphology Topics
A. L. Bloom.

651 Petrology and Geochemistry
R. W. Kay.

653 Mineralogy and Crystallography, X-Ray Diffraction, Microscopy, High-Pressure/Temperature Experiments
W. A. Bassett.

655 Advanced Topics in Petrology and Tectonics
J. M. Bird, W. A. Bassett.

661 Topics in Mineral Resource Studies and Precambrian Geology
A. K. Gibbs.

671 Advanced Topics in Sedimentology and Stratigraphy
T. E. Jordan.

673 Paleobiology
J. L. Cisne.

680 Seismic Record Reading
B. L. Isacks.

681 Geophysics, Exploration Seismology
L. D. Brown.

683 Earthquakes and Tectonics
B. L. Isacks.

685 Exploration Seismology, Gravity, Magnetics
S. Kaufman.

687 Geophysics, Seismology, and Geotectonics
J. E. Oliver.

689 Research on Seismic-Reflection Profiling of the Continental Crust
J. E. Oliver, L. D. Brown, S. Kaufman.

691 Philippine Geology and Tectonics
D. E. Karig.

693 Andes Seminar
B. L. Isacks, T. E. Jordan, A. L. Bloom, R. W. Allmendinger.

721 Marine Tectonics Fall. 3 credits
Prerequisites: Geol 326 and a course in geophysics. Offered alternate years.
3 lecs D. E. Karig.
Study of geophysical and geological characteristics of the earth's crust beneath the oceans. Emphasis on recent geologic data concerning plate margins in the oceans; island-arc systems, spreading systems, and transforms. Techniques for determining infinitesimal and finite plate rotations. Lectures and reviews of recent papers. Term project and paper required.

722 Advanced Structural Geology Spring. 3 credits. Prerequisites: Geol 326 and permission of instructors.
2 lecs, 1 lab, possible weekend field trips. D. E. Karig, R. W. Allmendinger.
Stress-strain theory and application. Advanced techniques of structural analysis. Topics will include finite and incremental strain measurement; microstructure, preferred orientation, and TEM analysis; pressure solution and cleavage development; and experimental deformation. Applications to deformation of unconsolidated sediments, brittle and brittle-ductile deformation of supracrustal strata, and ductile deformation of high-grade metamorphic rocks. Kinematic analysis of shear zones and folds in these regimes.

728 Geology of Orogenic Belts Spring. 4 credits. Prerequisite: permission of instructor.
T R 10:10–12:05. J. M Bird.
A seminar course in which students study specific geologic topics of an orogenic belt selected for study during the term. The course is intended to complement Geol 781.

[735 Advanced Geophysics I Fall. 3 credits
Prerequisite: Geol 388. Not offered 1984-85.
3 lecs. D. L. Turcotte.
Mantle convection, heat flow, the driving mechanism for plate tectonics, the energy balance, definition of the lithosphere]

[737 Advanced Geophysics II Spring. 3 credits.
Prerequisite: Geol 388. Not offered 1984-85.
3 lecs. D. L. Turcotte.
Gravity, figure of the earth, earth tides, magnetism, mechanical behavior of the lithosphere, changes in sea level.]

781 Geotectonics Fall. 4 credits. Prerequisite: permission of instructor.
2 lecs. J. M. Bird.
Theories of orogeny; ocean and continent evolution. Kinematics of lithosphere plates. Rock-time assemblages of modern oceans and continental margins, and analogs in ancient orogenic belts. Time-space reconstructions of specific regions. Problems of dynamic mechanisms—corollaries and evidence from crustal features.

[787 Seismology Fall. 3 credits. Prerequisite: T&AM 611 or equivalent. Offered alternate years. Not offered 1984-85.
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.]

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. Techniques for materials analysis: X-ray and electron diffraction, optical and electron microscopy. Design of experimental systems for the structural characterization of materials.

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. Seminconductor 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 312) Fall, spring. 3 credits.
Prerequisite: T&AM 202 or permission of instructor.
2 lecs, 1 lab.
For description see M&AE 312.

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 SiO_2, single-crystal growth, zone melting and zone refining, Burton-Prim-Shlicter theory of the effective distribution coefficient, epitaxial growth of silicon. Thermal oxidation of silicon to form 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-Scharff-Schiott 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 design of experimental equipment for 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.

447 Materials Design Concepts I Fall. 1 credit.
Speakers from industry and other institutions will give case studies of design problems. Students will write a proposal for a design-study project, which will be approved by the instructor. At the level of *Engineering Design,* by Dieter.

448 Materials Design Concepts II Spring. 2 credits Prerequisite: MS&E 447.
Each student is expected to complete an extensive design-study project and give a fifty-minute talk on a materials-design problem that includes a discussion of economic factors as well as the design of processes and the selection of materials. At the level of *Engineering Design,* by Dieter.

449 Introduction to Ceramics Fall. 3 credits. Prerequisite: MS&E 331 or permission of instructor. 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.

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 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.

454 Processing of Glass, Ceramic, and Glass-Ceramic Materials Spring. 3 credits. Offered alternate years.
Conventional and unconventional techniques for processing glass, glass-ceramic, and ceramic materials. Case studies illustrate the design, engineering, and scientific aspects of such processes. Vapor processes for high-purity optical fibers, hot-processing of ceramic turbine blades, photosensitive materials, and powder processing and sintering of ceramics will be discussed. This course is team-taught with two scientists from the research and development laboratory of Corning Glass Works.

455 Analysis of Manufacturing Processes (also M&AE 512) Spring. 3 credits. Prerequisite: M&AE 312. 3 recs.
For description see M&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.

463 Materials Design in Electronic Packaging Fall. 3 credits.
Design and materials needs for packaging technology, from chip to board. Principles involved in key areas of materials science, such as adhesion and metallization. Packaging materials to be discussed include metals, ceramics, and polymers.

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 sytems 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.
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 604 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 Spring. 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 tranport 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 Seminconductor Devices*, by Sze; *Ferromagnetism*, by Bozworth; and current review articles.

Speciality 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.
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.

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. Variable credit.
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 and Physics 112.
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 1984-85.
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&E 345) Fall; 1984 only. Enrollment limited to 80 students: upperclass mechanical engineering and materials science students have priority. Prerequisite: Engr 202 or permission of instructor.
2 lecs, 1 lab. Evening prelims may be given.
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.

312 Fundamentals of Manufacturing Processes (also MS&E 345) Spring; may be offered in Engineering Cooperative Program. 3 credits. Prerequisites: Engr 202 and 261, or permission of instructor.
2 lecs, 1 lab. Evening exams may be given.
M. C. Leu.
Yield criteria and plastic flow. Basic forming processes for engineering materials, including metals, polymers, ceramics, and composite materials. Material removal and joining processes. Numerical control. Industrial robots. Computer-integrated manufacturing.

323 Introductory Fluid Mechanics Fall; usually offered in Engineering Cooperative Program. 4 credits. Prerequisites: Engr 202 and 203 and coregistration in 221, or permission of instructor.
4 recs. Evening prelims.
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 Spring; may be offered in Engineering Cooperative Program. Prerequisite: M&AE 323.
2 lecs, 1 rec. Evening prelims. C. T. Avedisian.
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.
Application of the principles of mechanics and materials to problems of analysis and design of mechanical components and systems.

326 Systems Dynamics Spring; may be offered in Engineering Cooperative Program. 4 credits. Prerequisite: M&AE 325.
Evening prelims. S. L. Phoenix.
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 multidegree-of-freedom systems, linear control systems. PDF control, stability analysis.

327 Mechanical Engineering Laboratory Fall. 4 credits. Prerequisites: M&AE 324 and 326.
1 lec, 2 labs. E. L. Resler, Jr.
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&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&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. Power plant, driveline, brakes, suspension, and structure. Other vehicle types may be considered.

489 Computer-Aided Design Spring. 3 credits Limited to juniors and seniors. Fulfills computer applications requirement.
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 and inelastic behavior of crystalline solids. Application of slab models, bound theorems, and slipline theory to problems of forging, extrusion, and rolling. Analysis of sheet-metal forming, including forming limits and springback. Discussion of defect initiation during the forming process.

[513 Materials Engineering Spring. 3 credits. Prerequisite: M&AE 311, Engr 261, or permission of instructor. Students interested in this subject should consider taking MS&E 450, Physical Metallurgy. Not offered 1984-85.
Designed to promote understanding and provide guidelines in the design, selection, and use of modern engineering materials. Strong emphasis on analysis of composite materials and on failure behavior in modern structures.]

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 Robotics Fall. 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.
Application of industrial robots in the manufacturing environment. 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. Robot languages and programming methods.

563 Mechanical Components Spring. 3 credits. Prerequisite: M&AE 325.
J. F. Booker.
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.
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&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.

574 Industrial Automation Fall. 3-4 credits. Prerequisite: graduate standing or permission of instructor.
Lecs, labs. D. W. Pessen.
Introduction to industrial automation, switching theory, sensors, activators, microprocessors, and other logic devices. Applications to control and automation.

[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. Not offered 1984-85.
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 Fall. 3 credits. Open to qualified undergraduates. Prerequisite: M&AE 326 or equivalent.
2 recs, 1 lab. D. L. Taylor.
Further development of vibration phenomena in single-degree- and multidegree-of-freedom linear and nonlinear systems, with emphasis on engineering problems involving analysis and design.

578 Feedback Control Systems Spring. 3 credits. Open to qualified undergraduates. Prerequisite: M&AE 326 or permission of instructor.
2 recs, 1 lab.
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.
P. R. Dawson.
Application of finite-element methods to materials processing. Development of elastic-plastic, viscoplastic, and viscoelastic models for analyzing deformation during large strain forming operations, with emphasis on numerical implementation. Interaction of thermal, mechanical, and material structure behaviors. Application to bulk forming, polymer processing, and material joining.

670 Mechanical and Aerospace Structures II Spring. 4 credits. Prerequisite: M&AE 569 or permission of instructor.
J. F. Booker.
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 multidegree-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 Fall. 4 credits. Open to qualified undergraduates who have permission of instructor. Prerequisite: previous exposure to systems dynamics and digital programming. Not offered 1984-85.
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.
Special problems of current interest in hydrodynamic lubrication. General topics include viscous flow in thin films, self-acting and externally pressurized bearings with liquid and gas lubricant films, bearing-system dynamics, and computational methods. 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 ocmposites.

685 Optimum Design of Mechanical Systems Fall. 4 credits. Prerequisite: graduate standing or permission of instructor.
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.
A. R. George.
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 1984-85.
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.
Review of thermodynamics. Applications to phase changes, heat engines, and combustion. Magnetohydrodynamic and ferrocaloric power generation. Statistical basis of thermodynamic laws and applications to lasers and semiconductors.

449 Combustion Engines Spring. 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. Not offered 1984-85.
3 lecs.
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.
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 and senior or graduate standing or permission of instructor.
F. K. Moore.
Inviscid fluid dynamics and aerodynamics, including imcompressible and supersonic flows, flow over bodies, lift, and drag. Shock waves. Courses 530 and 531 are of interest primarily to seniors and M.Eng. students; however, incoming M.S. or Ph.D. students who will not major in fluid mechanics but need competence in problem solving and basic problem formulation should be interested also. The courses may be taken independently or as a sequence.

531 Boundary Layers Spring. 3 credits. Prerequisite: M&AE 323 and senior or graduate standing or permission of instructor. Recommended: M&AE 530 or equivalent.
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 lecs. F. K. Moore.
Aerothermodynamic design of turbomachines in general, energy transfer between fluid and rotor in specific types, axial and radial devices, compressible flow. Three-dimensional effects, surging.

543 Combustion Processes Spring. 3 credits. Prerequisites: M&AE 323 and 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. Conta.
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 environment 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.
3 lecs.
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 EE 484 and NS&E 484) Spring. 3 credits. Prerequisites: Physics 112, 213, and 214, or equivalent background in electricity and magnetism and mechanics, with permission of instructor. Intended for seniors and graduate students.
3 lecs. D. A. Hammer.
Introduction to the physical principles and technology underlying controlled fusion power. Topics include fundamental aspects of the physics of ionized gases at high temperature (thermonuclear plasmas), requirements (in principle) for achievement of net

power from fusion, technological problems of an actual fusion reactor, and progress of the fusion program toward overcoming these problems. Both magnetic and inertial confinement fusion are discussed, and comparisons are made between fusion and fission.

601 Foundations of Fluid Dynamics and Aerodynamics Fall. 4 credits. Prerequisite: graduate standing or permission of instructor.
S. B. Pope.
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.
Basic equations for inviscid fluid motion. Vorticity dynamics. General results for irrotational flows. Integral representations via Green's theorem. Solution methods based on singularities. Complex variable technique for two-dimensional flows. Airfoil, wing, and slender-body theories. Unsteady phenomena.

603 Compressible Aerodynamics Spring 4 credits. Prerequisite: M&AE 601 or equivalent or permission of instructor.
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.
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 oscillator, 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, time permitting.

[630 Atmospheric Turbulence and Micrometeorology Spring. 4 credits. Open to qualified undergraduates with permission of instructor. Offered alternate years. Not offered 1984-85.
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 1984-85.
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 Spring. 4 credits Prerequisite: graduate standing or permission of instructor.
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 Fall. 4 credits. Prerequisite: graduate standing or permission of instructor.
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 Fall. 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 lecs, 1 lab.
Study of experimental techniques for measuring pressure, temperature, velocity, and composition of gases, with emphasis on experimental capabilities and physical principles. Topics include laser velocimetry, hot-wire anemometry, spectroscopy, and laser scattering.

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. Not offered 1984-85.
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. Langerin and Fokko-Planck equations: turbulent dispersion. The course emphasizes comparison of theory with experimental data.]

733 Stability of Fluid Flow Spring 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 Fall. 4 credits. Prerequisite: M&AE 601 or permission of instructor.
J. L. Lumley.
Topics include the dynamics of buoyancy and shear-driven turbulence, boundary-free and bounded shear flows, second-order modeling, the statistical description of turbulence, turbulent transport, and spectral dynamics.

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. Spin-up. 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 which are dominantly hyperbolic (such as unsteady flows and shocks) or are mixed elliptic-hyperbolic (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-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 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.
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.
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 faculty.

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 faculty.

Nuclear Science and Engineering

A number of courses in nuclear science and engineering are offered through the School of Applied and Engineering Physics; see A&EP 609, 612, 613, 633, 634, 636, 638, 651, and 652.

121 Fission, Fusion, and Radiation (also Engr 121) 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. D. A. Hammer.
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. 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.

305 Introduction to Nuclear Science and Engineering III Spring. 1 credit. Prerequisite: NS&E 303.
1 lec. D. D. Clark.
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 NS&E 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. D. A. Hammer.
Introduction to the physical principles and technology underlying controlled-fusion power. Topics include fundamental aspects of the physics of ionized gases at high temperature (thermonuclear plasmas), requirements (in principle) for achievement of net power from fusion, technological problems of an actual fusion reactor, and progress of the fusion program toward overcoming these problems. Both magnetic and inertial confinement fusion are discussed, and comparisons are made between fusion and fission.

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 1984-85.
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. Evening prelims.
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, spring. 4 credits. Prerequisite: OR&IE 260 or equivalent.
3 lecs, 1 rec.
Basic concepts and techniques of random processes are used to construct models for a variety of problems of practical interest. Topics include the Poisson process, Markov chains, renewal theory, models for queueing and reliability.

370 Introduction to Statistical Theory with Engineering Applications Fall, spring. 4 credits. Prerequisite: OR&IE 260 or equivalent.
3 lecs, 1 rec.
Provides a working knowledge of basic statistics as it is most often applied in engineering and a basis in statistical theory for continued study. Topics include a review of distributions of special interest in statistics; testing simple and composite hypotheses; point and interval estimation; correlation; linear regression.

410 Industrial Systems Analysis Spring. 4 credits. Prerequisite: OR&IE 350. Corequisite: OR&IE 370.
3 lecs, 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.
2 lecs, 1 rec.
Design of the layout of processes and storage areas and the material-handling system for movement of items. Typical equipment used. 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 lecs.
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. 4 credits. Prerequisite: OR&IE 320 or permission of instructor.
3 lecs, 1 rec.
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 lecs.
A broad survey of the mathematical theory of games, including such topics as two-person matrix and bimatrix games; cooperative and noncooperative n-person games; games in extensive, normal, and characteristic function form. Economic market games. Applications to weighted voting and cost allocation.

[462 Introductory Engineering Stochastic Processes II Fall. 4 credits. Prerequisite: OR&IE 361 or equivalent. Not offered 1984-85.
3 lecs, 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 lecs, 1 rec.
Theory of multiple linear regression and its application 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 370 or equivalent. Not offered 1984-85.
3 lecs.
Decision rules, admissible decision rules, Bayes decision rules, minimax decision rules. Using regret instead of loss. Criteria for choosing a decision rule and relation to theory of games. Use of linear programming to construct minimax decision rules. Building cost of collecting information into the loss function. Decision problems requiring a sequence of decisions over time and relation to dynamic programming. Use of the empirical cumulative distribution function and applications to inventory problems. Classical statistical theory as special cases of statistical decision theory.]

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. Not offered 1984-85.
3 lecs, 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.
3 lecs.
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 lecs, 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. Distribution problems are analyzed. Applications are stressed.

563 Applied Time Series Analysis Spring 3 credits. Prerequisite: OR&IE 361 and CS 211, or permission of instructor.
2 lecs, 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. Not offered 1984-85.
3 lecs.
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 lecs, 1 rec.
Digital computer programs to simulate the operation of complex discrete systems in time. Modeling, program organization, pseudo-random-variable generation, simulation languages, statistical considerations; applications to a variety of problem areas.

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.

622 Operations Research I Fall. 4 credits. Not open to students who have had OR&IE 320.
3 lecs, 1 rec.
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 4 credits. Not open to students who have had OR&IE 361. Prerequisite: OR&IE 260 or 270 or permission of instructor.
3 lecs, 1 rec.
Basic concepts and techniques of random processes are used to construct models for a variety of problems of practical interest. Topics include the Poisson process, Markov chains, renewal theory, models for queuing, and reliability.

[625 Scheduling Theory Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1984-85.
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. Not offered 1984-85.
3 lecs.
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. Not offered 1984-85.
3 lecs.
Necessary and sufficient conditions for unconstrained and constrained optima. Duality theory. Computational methods for unconstrained, (e.g., quasi-Newton) problems, linearly constrained, (e.g., active set) problems, and nonlinearly constrained (e.g., successive quadratic programming) problems.]

633 Graph Theory and Network Flows Spring. 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.
3 lecs.
Topics in combinatorics, graphs, and networks. These include matching, matroids, polyhedral combinatorics, and optimization algorithms.

636 Integer Programming Fall. 3 credits. Prerequisite: OR&IE 630.
3 lecs.
Discrete optimization. Linear programming in which the variables are restricted to being 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 Fall. 3 credits. Prerequisite: permission of instructor.
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.
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 431, or permission of instructor. Not offered 1984-85.
3 lecs.
Noncooperative n-person games; Nash equilibrium points. Cooperative n-person games; the core, stable sets, Shapley value, bargaining set, kernel, nucleolus. Selected applications.]

646 Game Theory II Fall. 3 credits. Prerequisite: OR&IE 645.
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 Fall. 3 credits. Prerequisite: permission of instructor.
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.
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. Not offered 1984-85.
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 1984-85.
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 phenomen, storage models, and environmental management are discussed.]

[665 Advanced Queueing Theory Fall. 3 credits. Prerequisite: OR&IE 660 or equivalent. Not offered 1984-85.
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; introduction to linear models.

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. 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 1984-85.
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 Fall. 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.
3 lecs.
Use and analysis of experimental designs such as randomized blocks, balanced incomplete blocks, and Latin squares; analysis of variance and covariance, factorial experiments; statistical problems associated with finding best operating conditions; response-surface analysis.

675 Qualitative Data Analysis Spring. 3 credits. Prerequisite: OR&IE 671.
Varieties of categorical data; cross classifications and contingency tables; simultaneous estimation of parameters; 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; paired comparison experiments.

[676 Statistical Analysis of Life Data Fall. 3 credits. Prerequisite: OR&IE 671 or equivalent. Not offered 1984-85.
Analysis of data from reliability, fatigue, and life-testing studies in engineering; biomedical applications. Survival distributions, hazard rate, censoring. Life tables. Estimation and hypothesis testing. Standards. Goodness of fit, hazard plotting. Covariance analysis, accelerated life testing. Multiple decrement models, competing risks. Sample-size determination. Adaptive sampling.]

[677 Statistical Selection and Ranking Procedures Spring. 3 credits. Prerequisite: OR&IE 674 or permission of instructor. Not offered 1984-85.
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. Not offered 1984-85.
3 lecs.
An advanced version of OR&IE 580, intended for Ph.D.-level students.]

728-729 Selected Topics in Applied Operations Research Fall, spring. Credit to be arranged.
Current research topics dealing with applications of operations research.

738-739 Selected Topics in Mathematical Programming Fall, 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 Fall, 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 1½-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.

293 Engineering Mathematics with Microcomputers (also Mathematics 293C) Fall only. 3 credits. Prerequisite: Mathematics 192 or 194.
2 lecs, 1 rec, 4 labs during semester.
Same topics as T&AM 293, Engineering Mathematics, but with four microcomputer experiments using computer algebra to solve problems.

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.

294 Engineering Mathematics with Microcomputers (also Mathematics 294C) Spring only. 4 credits. Prerequisite: Mathematics 293.
2 lecs, 1 rec, 4 labs during semester.
Same topics as T&AM 294, Engineering Mathematics, but with four microcomputer experiments using computer algebra to solve problems.

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. Use of computer algebra and MACSYMA to solve problems.

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.

617 Computer Algebra in Applied Mathematics Fall. 2 credits. Prerequisite: T&AM 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.

Experimental Mechanics

640 Experimental Mechanics Fall. 3 credits.
1 lec, 1 rec, 1 lab.
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 continous 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. Not offered 1984-85.
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 1984-85.
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. Not offered 1984-85.
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 Spring. 3 credits. Offered alternate years.
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. Not offered 1984-85.
Two 1½-hour lecs, 4 labs each semester.
Review of vibrations of discrete systems, including multidegree-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 1½-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 1½-hour lecs.
Analysis of stress and strain. Airy's stress function solutions using Fourier series and integrals. Torsion theory. Three-dimensional solutions. Bending of prismatical 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. Laboratory work is required. At the level of *Fundamentals of Acoustics,* by Kinsler, Frey, Coppens, and Sanders.

[765 Mathematical Theory of Elasticity Spring. 3 credits. Prerequisite: T&AM 664. Offered alternate years. Not offered 1984-85.
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 1984-85.
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 1¼-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&AM 570 or equivalent. Offered alternate years.
Review of Lagrangian mechanics; Hamilton's principle, the principle of least action, and related topics from the calculus of variations; Hamilton's canonical equations; approximate methods for two-degrees-of-freedom systems (Lie transforms); canonical transformations and Hamilton-Jacobi theory; Poisson stability and related topics from topological dynamics; Hamilton's principle for continuous sytems, applications to shell dynamics.

672 Celestial Mechanics (also Astronomy 579) Fall. 3 credits. Offered alternate years.
Two 1¼-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. Not offered 1984-85.
Two 1¼-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&AM 574 or equivalent. Offered alternate years. Not offered 1984-85.
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. Suggested prerequisite: T&AM 675, Mathematics 517, or equivalent. Offered alternate years.
Review of planar (single-degree-of-freedom) systems. Local and global analysis. Structural stability and bifurcations in planar systems. Center manifolds and normal forms. The averaging theorem and perturbation methods. 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.

796-797 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.

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 Master's Degree Research in Theoretical and Applied Mechanics Fall, spring. 1-6 credits, as arranged. S-U grades optional.
Thesis or independent research at the M.S. level on a subject of theoretical and applied mechanics. Research is under the guidance of a faculty member.

990 Doctoral Research in Theoretical and Applied Mechanics Fall, spring. 1-9 credits, as arranged. S-U grades optional.
Thesis or independent research at the Ph.D. level on a subject of theoretical and applied mechanics. Research is under the guidance of a faculty member.

Faculty Roster

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
Allmendinger, Richard, Ph.D., Stanford U. Asst. Prof., Geological Sciences
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
Babaoğlu, Özalp, Ph.D., U. of California at Berkeley. Asst. Prof., Computer Science
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
Bates, Joseph L., Ph.D., Cornell U. Asst. Prof., Computer Science
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. Prof., Nuclear Science and Engineering
Carlin, Herbert J., D.E.E., Polytechnic Inst. of Brooklyn. J. Preston Levis Professor of Engineering, Electrical Engineering
Carter, C. Barry, Ph.D., Oxford U. (England). Assoc. Prof., Materials Science and Engineering
Caughey, David A., Ph.D., Princeton U. Prof., Mechanical and Aerospace Engineering
Cisne, John L., Ph.D., U. of Chicago. Assoc. Prof., Geological Sciences
Clancy, Paulette, Ph.D., Oxford U. (England). Asst. Prof., Chemical Engineering
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
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
Conway, Harry D., Sc.D., Cambridge U. (England). Prof., Theoretical and Applied Mechanics
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
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
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., Ph.D., Technische Hoch., München (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., Technische Hoch., München (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). Assoc. 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. 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). Prof., Theoretical and Applied Mechanics
Hopcroft, John E., Ph.D., Stanford U. Prof., Computer Science
Hover, Kenneth C., Ph.D., Cornell U. Asst. Prof., Civil and Environmental Engineering
Hui, Chung Y., Ph.D., Harvard U. Asst. Prof., Theoretical and Applied Mechanics
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. 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
Jordan, Teresa, Ph.D., Stanford U. Asst. Prof., Geological Sciences
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, Myunghawan, 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. Prof., Applied and Engineering Physics
Li, Che-Yu, Ph.D., Cornell U. Prof., Materials Science and 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
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. Assoc. Prof., Electrical Engineering
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
MacDonald, Noel C., Ph.D., U. of California at Berkeley. Prof., Electrical 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, Arnim 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
Nicolau, Alexandru, Ph.D., Yale U. Asst. Prof., Computer Science
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
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
Santosa, Fadil, Ph.D., U. of Illinois. Asst. Prof., Theoretical and Applied Mechanics
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. 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
Stedinger, Jery R., Ph.D., Harvard U. Assoc. Prof., Civil and Environmental Engineering
Steen, Paul H., Ph.D., Johns Hopkins U. Asst. Prof., Chemical Engineering
Steenhuis, Tammo S., Ph.D., U. of Wisconsin., Asst. Prof., Agricultural 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
Taqqu, 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
Thompson, Michael O., Ph.D., Cornell U. Asst. Prof., Materials Science and Engineering
Thorp, James S., Ph.D., Cornell U. Prof., Electrical Engineering
Thorpe, Raymond G., M.Ch.E., Cornell U. 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. 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. 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
Vazirani, Vijay, Ph.D., U. of California at Berkeley. Asst. Prof., Computer Science
VonBerg, 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, Zellman, 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
Wong, Simon, Ph.D., U. of California at Berkeley. Asst. Prof., Electrical Engineering
Wood, Sally L., Ph.D., Stanford U. Asst. Prof., Electrical Engineering

Graduate School

Administration

Alison P. Casarett, dean
Joycelyn Hart, assistant dean
Ken Strike, secretary of the graduate faculty

Graduate study at Cornell is pursued through the Graduate School, which administers the many graduate fields of study, or 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.), and Master of Business Administration (M.B.A.) are not administered by the Graduate School. Information on those programs can be obtained from the Law School, the Medical College (New York City), the College of Veterinary Medicine, and the Graduate School of Management, respectively.

Graduate School

The graduate program at Cornell permits an unusual degree of accommodation to the needs and interests of the individual student. Degree requirements are kept to a minimum. There are no specific course or credit requirements for the advanced general degrees of Master of Arts, Master of Science, and Doctor of Philosophy, but only such general requirements that best accomplish the aim of graduate study: a period of study in residence, the mastery of one subject, adequate knowledge of allied subjects, oral examinations to establish competency for presentation of a 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 non–degree 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 *Admission to Graduate Study: Cornell University.* 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
Peter Rainsford, assistant dean for business and administration
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
Fred Antil, director of placement and corporate relations
Joan S. Livingston, executive editor, *The Cornell Hotel and Restaurant Administration Quarterly*
Mary K. Milks, registrar
Margaret J. Oaksford, librarian
Maureen McKenna, external-programs administrator

Degree Program

	Degree
Hotel and Restaurant Administration	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.

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

*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.

**As set forth in the *Practice Instruction Handbook*, supplied on request from the School of Hotel Administration.

managerial instruction and experience. For the details of these programs, see "Directed Study," on the following pages.

Course Requirements for Graduation

Specifically required courses	*Credits*
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
Specifically required credits	84
Hotel electives	14
Free electives	24
Total credits required for graduation	**122**

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.

Specifically required courses	*Credits*
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

*Suggested electives**	*Credits*
H Adm 102, Lectures in Hotel Management	1
H Adm 161, Typewriting	2

Sophomore Year

Specifically required courses	*Credits*
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
H Adm 265, Effective Communication	3
H Adm 331, Food Production Systems: Restaurants	3
	30

Suggested electives	*Credits*
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

Specifically required courses	*Credits*
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

Suggested electives	*Credits*
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
Management NBA 505, Auditing	3

Senior Year

Specifically required courses	*Credits*
H Adm 451, Physical-Plant Planning and Construction	3

Suggested electives	*Credits*
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	†
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	†

*Fourteen credits of hotel electives are to be taken during the four-year undergraduate program.

†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.

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

Administrative and General Management	*Credits*
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

Human-Resources Management	*Credits*
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

Accounting and Financial Management	*Credits*
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

Food and Beverage Management	*Credits*
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

Law	*Credits*
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

Properties Management	*Credits*
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

Communication	*Credits*
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

Science and Technology	*Credits*
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

Economics, Marketing, and Tourism	*Credits*
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

Specifically required courses	*Credits*
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
Specifically required credits	39
Elective credits	25
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.

Study Abroad

Programs providing an opportunity to study in a foreign country and develop an awareness of the international component of our industry can contribute to each student's total educational experience. Students in recent years have studied in Italy, Spain, France, and England. Information on the many study-abroad programs operating during the summer and academic year is available at the Career Center.

Students should discuss their plans with the assistant dean of academic affairs so that all petition and credit evaluation procedures are followed.

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.
F 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 nonresident speakers 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. J. E. Petzing.
The private-membership club and how it differs from other forms of business in the hospitality industry. Topics include constitution and bylaws issues, administration and interface with board of directors and committees, recreation management, labor management, and marketing of major tournaments.

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 will be discussed. 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.
A lecture course in 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. Contract and noncontract relationships with the travel industry are reviewed. Terminology, rental-pool agreements, and S.E.C. regulations, state statutory requirements, developer-management-owner contracts, and relationships in condominiums are reviewed. Tax implications of both condominium ownership and management are fully considered.

206 General Insurance Fall. 3 credits. Hotel elective.
M W F 12:20. K. McNeill.
Designed to provide the student with a comprehensive introduction to the insurance field. The emphasis is on fire insurance, casualty insurance, and multiple-peril policies. Covered are such topics as 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.

302 Principles of Management Fall or spring. 3 credits. Limited to 24 students. 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 possible field trip to Washington, D C., $100.
F 1–4:30. S. Weisz and visiting lecturers.
An introductory course concentrating on the fundamentals of rooms-division management. Areas of concentration include front desk operations, reservations, housekeeping, and telephone departments. Particular emphasis on selling strategies, forecasting, rate efficiencies, labor management, and guest relations.

306 Hospitality Industry Real Estate Fall or spring. 3 credits. Prerequisites: H Adm 121, 125, 281, 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.

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 10:10–12:05. S. Hall.
This course develops 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, and each student prepares a comprehensive analytical report, based on previous work, for class discussion and analysis. Sufficient time is given during the first few weeks of the course to review management principles and concepts and thus give the student an understanding of the type of report he or she is to prepare and of the analysis required during the discussion period.

402 Hotel-Management Seminar Fall. 1 credit. Limited to 20 seniors and graduate students. Hotel elective.
F 2:30. Office of the Dean.
A weekly meeting with the H Adm 102 speaker of the day. The subject matter will, therefore, vary from week to week, depending on the area of expertise of the speaker. Students will be expected to ask questions and enter into discussion, since the class will be relatively unstructured.

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. S. A. Mutkoski.
The objective of the course is to develop a comprehensive knowledge of basic management fundamentals to plan, organize, direct, and control the small enterprise. Case-study method will be employed in addition to guest lecturers. There will be a team term project, selected readings, 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 will apply course principles through participation in a restaurant-management simulation exercise.

407 Seminar in Hotel Operations Spring. 2 credits. Limited to 30 students. Hotel elective. Estimated cost of field trip, $55.
F 10:10–12:05. R. M. Chase.
The objective of this course is to provide students with 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. The course will also pursue approaches designed toward maintaining operational control and evaluating overall performance within the hotel facility. 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 required field trip to the participating hotel will be an integral part of the study program. The field trip is usually scheduled for the second week of classes, therefore a student *cannot* miss the first week and register in the course. If a student intends to return to school one week late, he or she should not attempt to preregister for this course.

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 objective of this course is to provide the student with an understanding of the management responsibility of casino operations and of the operational differences between, and management philosophies of, casino and noncasino hotels. Overview and analysis of casino administration, with emphasis on relationships and responsibilities between hotel general manager and the casino manager, marketing and junkets, physical layouts, licensing, government regulation, personnel and training, internal controls, and security systems. Includes field trip to Bally's Park Place Casino hotel in Atlantic City.

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. Gaurnier.
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. This course will also pursue approaches designed toward maintaining operational control and evaluating overall performance within the hotel facility. 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 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. Therefore a student *cannot* miss the first week and register in the course. If a student intends to return to school one week late, he or she should not attempt to preregister for this course.

Human-Resources Management Courses

111 Introductory Psychology Fall or spring. 3 credits. Required.
Lecs, M W 9:05; 2-hour lab to be arranged.
F. Berger.
An introductory study of principles of psychology important in understanding human behavior. Basic concepts of learning, motivation, personality, intelligence, human development, abnormal behavior, and therapy are discussed. Laboratory sessions focus on experiential development of human-relations skills.

211 Management of Human Resources Fall or spring. 3 credits. Prerequisite for hotel students: H Adm 111. Required.
Lecs, M W 11:15, 12:20, or 1:25; 1-hour lab to be arranged. D. A. Dermody.
A practically oriented approach to the problems of personnel management, starting with an introduction to the personnel function followed by the selection and placement of personnel; the role of supervision with emphasis on induction, training, communications, performance appraisal, and leadership style; a study of age and salary administration; motivation; and a discussion of union-management relations. Emphasis will be placed on class discussion and business and industry. (There will be two evening prelims. There will be two Saturday morning classes of two hours duration scheduled with special guest speakers.)

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.

411 Hotel Manpower Management Simulation Spring. 3 credits. Limited to 20 School of Hotel Administration seniors and graduate students. Hotel elective.
F 9:30–12. W. Wasmuth.
The course is based on CHARMS (Cornell Hotel and Restaurant Management Simulation), the simulation of a hotel banquet facility developed by Professors Wasmuth and Davis. The interest of the course is to have students learn management principles from participation in the simulation and also to provide advanced training in the use of a simulation as a training device. Working in groups of four or five, students will be asked to develop additional portions of the simulation exercise for solution by their peers. A trip to a local banquet facility will be required, for which a small (approximately $1) transportation charge will be assessed.

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.
Applications of organizational behavior principles will be explored through lectures, case studies, and management games and exercises. Students will participate in experiential laboratories aimed at enhancing their effectiveness as members or leaders of groups. Topics that will be studied include 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 totally case-study approach to the problems and challenges of managing people in business organizations. Actual cases are presented by individuals who were involved in the cases. Student (suggested) resolution of the cases will be compared to the resolution that actually took place.

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 Management of Human Resources (H Adm 211) or some other course is exposed to recommended techniques of instruction and such other methodology, readings, etc., as the professor in charge of the course may require.

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.
W 2:30–4:25. T. Cole.
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. May be taken with H Adm 322 to include the investment aspects of financial management.

121 Financial Accounting Fall or spring. 3 credits. Required. Limited to School of Hotel Administration students.
Lecs, T R 11:15; 1-hour lab to be arranged.
D. C. Dunn.
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.

125 Finance Fall or spring. 3 credits. Prerequisite: H Adm 121 or equivalent. Required.
T R 12:20, 1-hour F lab to be arranged.
R. M. Chase.
An objective study of the financial function 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. J. Stephan.
An introduction to the basic principles of accounting, involving transaction analysis, flow of accounting data to the financial statements, and careful consideration of accounting for revenues, expenses, assets, liabilities, and owner's equity.

221 Managerial Accounting Fall or spring. 3 credits. Prerequisites: H Adm 121 and 125, or equivalent. Required.
Lecs, M W 10:10; 2-hour lab to be arranged. Two evening exams to be arranged. D. H. Ferguson.
The overall objective is 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, M W 10:10; 1-hour lab to be arranged.
C. Henry.
Methods of operational analysis for hospitality properties are evaluated and utilized 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 placed upon the student's ability to communicate analytical results through the use of 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-42 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. In addition, there will be brief demonstrations of computerized equipment.

321 Hospitality Management Contracts Fall, 7 weeks only. 1 credit. Hotel elective.
T 2:30–4:25. J. J. Eyster and guest lecturers.
The negotiation and the administration of hospitality management contracts are discussed with major emphasis on contract concerns of owners and operators, financial assessment of owner and operator returns, development of negotiating strategies, and alternative forms of operating agreements.

322 Investment Management Fall or spring. 2 credits. Limited to juniors, seniors, and graduate students. Hotel elective.
R 10:10–12:05. A. Arbel.
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. C. 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.

328 Cost Accounting Spring. 3 credits. Prerequisite: H Adm 221 or equivalent. Hotel elective.
M 12:20, W 12:20–2:15. 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. 7 weeks only. 2 credits. Limited to seniors, graduate students, and others who have received permission of instructor. Prerequisite: H Adm 122, 722, or equivalent. Hotel elective.
T R 9:05 or T R 10:10. M. Waters.
Discussion of problems encountered in distributing the accounting and clerical work in hotels so as to provide 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 and how they differ; use of depreciation methods to achieve tax reductions; syndication techniques; and the role tax laws play in promoting private investment and development.

722 Graduate Managerial Accounting in the Hospitality Industry Spring. 3 credits. Required M.P.S. course.
T R 2:30–4.25. C. Henry.
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 placed upon the student's ability to communicate analytical results through the use of 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.
A. Arbel.
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, divided policy, long-term financing and bank relations, short- and intermediate-term financial management, and mergers and consolidations. Computer-assisted decision support models are applied in a realistic manner using interactive packages.

729 Graduate Investment Portfolio Management Spring. 3 credits. Limited to 20 students. Prerequisites: background in economics (H Adm 281/282 or equivalent, 722 or equivalent [222], 723 or equivalent [323]); undergraduates with adequate background and special motivation may be accepted—interview with and written permission of instructor required.
T R 2:30–4:25. A. Arbel.
The course will cover institutional and analytical aspects of security analysis and investment management, with special emphasis on the hospitality industry: securities markets, sources of investment information, risk-return analysis, bond and stock valuation models, behavior of security prices, portfolio analysis, and portfolio management.

Food and Beverage Management Courses

131 Introduction to Food and Beverage Operation and Management Fall or spring 2 credits. Required.
W 10:10–12:05. J. B. Knight.
An introductory lecture course that provides terminology of production and service of food and beverage in hotels, restaurants, health care, transportation, and other industries. The language of preparation, equipment, and beverage will compose a 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. D. W. D'Aprix.
A laboratory-based course designed to familiarize students with techniques and procedures of commercial food preparation. 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, T. Neuhaus.
The purpose of this course is to assist the student in developing understanding and applying concepts of meat science, so that all phases of meat, fish, and poultry can be professionally managed in a commercial food-service operation. The course is structured so that these concepts can be used as managerial tools in (1) menu planning, (2) writing of specifications, (3) purchasing, (4) receiving, (5) storage and handling, (6) preparation, (7) service, and (8) cost analysis.

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. Colucci, C. Bamford, M. Degan.
A cafeteria food-production course in which the student participates as a team member in hot-food, cold-food, dessert, and bakery production as well as sanitation. 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 132 or written permission of instructor. Hotel elective.
T R 9:05. 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 studied and applied to operational situations.

331 Food-Production Systems: Restaurants Fall or spring. 3 credits. Prerequisite: H Adm 233. Required. Students taking H Adm 233 are *required* to register in H Adm 331 the following semester.
Lec, M 1:25; 8-hour lab M T W or R. T. J. Kelly, R. White, M. Nowlis.
A food-production management course in which each student participates as manager of the evening and team member in a la carte production and service. Lecture includes menu planning for a la carte and banquet operations, management functions in a la carte production and service, dining room organization and management, scheduling, pricing, and accountability in food management, as well as alcoholic beverage management and service related to a la carte operation. Laboratories include hands-on managerial function production. As production manager the student is required to prepare a complete planning and summary report. *Students are required to provide their own French knife, measuring spoons, food thermometer, and sturdy, comfortable shoes (black, low heel for service and nonskid type for production).*

333 Restaurant Management Fall or spring. 3 credits. Limited to 30 students. Hotel elective. Prerequisites: H Adm 131, 132, 231, 233, and 331.
T 2:30–4:25, R 2:30. S. A. Mutkoski.
This course will take a systems approach to opening, operating, and analyzing a food and beverage facility. The course will deal with free-standing restaurants as well as hotel and resort food and beverage facilities. Case studies as well as a term project will be used to help students apply their background knowledge to operational situations.

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.
To assist the student in developing, understanding, and applying concepts of purchasing, so that the purchasing functions of a hospitality property can be properly established and professionally managed. To expose the student to the various products that are germane to the operation of a hotel or a restaurant: china, glassware, flatware, linen, etc., with the intent that the student understands the quality ranges available in a particular product, the cost considerations, quantities required, etc., so that informed purchase decisions can be made. These products will be displayed by leading manufacturers and purveyors, and the quality aspects, costs, etc., will be discussed in detail.

430 Introduction to Wine and Spirits Fall or spring. 2 credits. S-U grades only. Open to juniors and seniors in the Hotel School and seniors and graduate students in all other colleges.
W 2:30–4:25. V. A. Christian and guest lecturers.
The main focus of the course will be on identifying flavor characteristics and the factors that influence flavor. Lectures will be given on tasting techniques, developing a wine cellar, and combining food with wine. Samples from a variety of countries, regions, and vineyards will be 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 their preenrolled status, requiring the student to follow the normal drop procedure.

433 Food-Service Management in Business-, Industry-, and Health-related Facilities Fall or spring. 3 credits. Limited to 35 seniors and graduate students. Prerequisites: H Adm 331 or 732, or equivalent. Recommended: a nutrition course. Hotel elective. Estimated cost of required field trip, $150.
M 9:05–10:55, W 9:05–11. 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 (specific to food, labor, quality, safety, and sanitation), external 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 Dessert Merchandising Fall or spring. 3 credits. Prerequisites: H Adm 331, 771, or 732. Hotel elective.
Lec, T R 9:05–10:35 (first 8 weeks); lab, F 12:20–5:30 (last 4 weeks). T. Neuhaus.
The course is an introduction to ingredients, interactions, product perishability, portion control, waste management, pricing strategy, menu selection, and convenience items, specifically related to desserts, pastries, and breads.

437 Seminar in International Cuisines Spring. 3 credits. Limited to 30 students. Prerequisites: H Adm 331 or 732 and permission of instructor. Hotel elective.
Lec, 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 several international cuisines, enabling students to create diverse menus. Each student will be involved in doing a major research paper and oral presentation, as well as in designing and orchestrating the preparation of menus.

731 Food and Beverage Management Fall or spring. 3 credits. Required M.P.S. course. Estimated cost of field trip, $100.
Lecs, T R 11:15–12:30. Three evening classes to be arranged. V. A. Christian.
This course will present state-of-the-art food and beverage knowledge, skills, and attitudes that are being practiced in the hospitality industry. Upon termination of the course each student should possess knowledge of menu planning, merchandising, purchasing, and service. Managerial skills on how to research and document policies, procedures, and standards; how to plan, organize, staff, and direct activities.

732 Graduate Operational Food-Production Systems Fall or spring. Limited to 24 students. Prerequisites: H Adm 771, 731, and 773 (possible corequisite). Required M.P.S. course. Estimated expense for clothing and utensils, $95.
Lec, W 5:30–8:30 p.m.; 8-hour F lab. J. B. Knight, D. W. D'Aprix, B. A. Schmidt.
Students are responsible for production and service of dinner for the Statler Inn Main Dining Room. 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. This will be done in a seminar-lab combination with students also required to do independent research on current problems in the meat area.

Law Courses

341 Law of Business I Fall. 3 credits. Limited to juniors and seniors. Required.
M W F 12:20. J. E. H. Sherry.
This course is designed to enable the student to acquire a basic understanding of law and legal relationships in a business context. A variety of subjects are covered, all intended to aid a person in making decisions as an executive charged with managerial responsibilities.

342 Law of Business II Spring. 3 credits. Open only to juniors, seniors, or graduate students.
M W F 12:20. J. E. H. Sherry.
Laws pertaining to the Uniform Commercial Code, bailments, trusts and estates, transfers of will, unfair competition and trade regulation, bankruptcy, and insurance.

344 Law of Innkeeping Fall or spring. 3 credits. Limited to juniors and seniors. Prerequisite: H Adm 341 or equivalent. Required.
M W F 9:05. J. E. H. Sherry.
The aim of this course is to give the student 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.

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.
This graduate-level course is designed to review fundamentals and develop sophistication in dealing with the legal aspects of the hospitality industry. Areas of the law that require greater insight will be stressed.

Properties Management Courses

252 Facilities Development and Planning Fall or spring. 4 credits.
T R 11:15–12:30 (three 1-hour lectures; one 2-hour lab). D. Oswald.
This lecture-studio course is an introduction to the development and planning of hospitality facilities and properties management. Course components include graphic presentation techniques, the project development sequence, site analysis, conceptual planning, programming, budgeting, fundamental space-planning issues, and architectural design principles for the hospitality industry. Students achieve basic graphic skills, interpret architectural documents, and develop schematic layouts for lodging and dining spaces.

353 Introductory Food-Facilities Engineering Fall. 3 credits. Limited to 15 students. Prerequisites: H Adm 251 or equivalent, and written permission of instructor before course registration. Hotel elective.
Lecs, M W 1:25; 2-hour lab to be arranged.
M. H. Redlin.
A course designed to familiarize the student with 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. The students will utilize laboratory time for the planning, design, and specification writing for a small- to medium-size restaurant kitchen.

354 Food-Facilities Layout and Design Spring. 3 credits. Prerequisite: H Adm 353 or equivalent.
Lecs, M W 1:25; 2-hour lab to be arranged.
R. A. Compton.
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.

356 Building Engineering Systems Fall or spring. 3 credits. Prerequisite: H Adm 256.
T R 11:15–12:30, plus 1-hour lab. D. M. Stipanuk.
This course provides an overview of the major systems that comprise the physical plant in hospitality buildings. The primary emphasis is on the students' acquiring a basic understanding of water, electric, heating, cooling, and refrigeration systems and their effect on building operations. An introduction to energy-management systems and techniques is also included.

357 Construction and Physical Plant Management Fall or spring. 3 credits. Prerequisite: H Adm 356. Not offered fall 1984.
Hours to be arranged. Faculty.
Course components include construction contracts, bid procedures and analysis, management of new and renovation projects, construction budgeting and financing, construction materials and methods, organization and management of the POM&E department, security and life-safety systems, and routine and preventive maintenance. This course requires the students to apply the knowledge gained in the previous properties management courses as well as other School of Hotel Administration required courses, such as accounting and financial

management, information systems, and food and beverage. Case studies, recitation assignments, and projects are an integral part of the course.

452 Seminar in Interior Design Spring. 3 credits. Limited to 12 juniors, seniors, and graduate students. Hotel elective. Minimum cost of required field trips, $200.
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 develop preliminary conceptual designs leading to a substantial graphic presentation at the end of the term. Drawing ability is essential.

453 Energy-Management Techniques Spring. 3 credits. Limited to 20 students. Prerequisite: H Adm 352 or 752. Hotel elective.
T R 2:30–3:45. D. M. Stipanuk.
Energy audit, management, and conservation methods for hotels and restaurants will be considered. Simple computer programs (no programming) will be used to help illustrate methods. A framework for developing an energy-management program will be developed. Students will conduct an energy audit of either a hotel or restaurant.

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.
T R 11:15–1:10. R. H. Penner.
A seminar course intended to acquaint the student with the hotel planning process. The emphasis will be on 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 term projects will be developed.

455 Seminar in Restaurant Planning Fall or spring. 3 credits. Limited to 12 students. Prerequisites: H Adm 351 and written permission of instructor. Hotel elective. Estimated cost of optional field trip, $150.
M W F 9:05. R. A. Compton.
A seminar course intended to acquaint the student with 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.

659 Fire Prevention and Safety Control for the Hospitality Industry Spring. 2 credits. Limited to juniors, seniors, and graduate students only. Prerequisite: H Adm 351 or 752.
T 1:25–3:20. E. Dymek.
This course presents a coordinated approach to managing the risk associated with fire protection and prevention, safety, and security problems specifically for the hospitality industry. Case studies are used to identify major exposures to accidental loss, including property damage, personnel accidents, and losses arising out of third-party liabilities. Fire protection and prevention issues are emphasized.

751 Project Development and Construction Fall. 3 credits. Required M.P.S. course.
Lecs, T R 1–2:15; 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.
Lecs, 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. Systems include water, heating, refrigeration, air conditioning, electrical, and lighting systems. Management concepts dealing with property operations, repairs and maintenance, and energy conservation are emphasized. Students analyze case studies, criticize papers and reports, and suggest new systems and modifications.

Communication Courses

161 Keyboading-Typewriting Fall or spring. 2 credits. Limited to 35 students per section. 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 keyboarding 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. *Please note:* Because of the class-size limitation, a student who chooses to drop this course should notify the instructor no later than the end of the first week of class so another student can fill the opening. Must be completed in the freshman year.
M W F 9:05, 10:10, 11:15; or M W 1:25 and F 9:05; M W 2:30 and F 10:10; or M W 3:35 and F 11:15.
D. A. Jameson, D. G. Flash, J. F. Lumley, C. Solomon.
Written reports provide the information people in organizations need to form judgments and to 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 strengthening skills in organizing and outlining, understanding and using research sources, and developing skills in writing clearly and precisely. To apply the skills, students write both internal and external 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.
Lec, T 10:10; sec, 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; M W 1:25 (spring only). B. B. David.
A course in electric typing designed for those students who can type but want to increase their efficiency, 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.

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.
Lecs, 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.

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. One major topic is how to plan and execute a job-hunting campaign, both before college graduation and later in one's career. Students prepare resumes, letters of application, and follow-up messages adapted to their individual needs. Conferences will be held to discuss these and other writing assignments. The writing assignments will give students a chance to apply the theories of communication, semantics, and human relations covered in the reading assignments and in class discussions.

765 Minicourse in Effective Oral Communication Fall or spring, weeks 1–7. 1 credit. Limited to 20 graduate students.
Hours to be arranged.
This course will concentrate on helping students in three areas: (1) making extemporaneous presentations on business topics with effective presentation design and delivery techniques; (2) selecting appropriate audiovisual support and using it effectively; (3) learning how to listen, interview, and run productive meetings. Video camera and tapes will be used in the classroom throughout the period. Individual conferences will be held at the beginning and end of the course.

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 Food-Service Microbiology Fall or spring. 2 credits. Required. *Please note:* Because of lab-size limitation, a student who chooses to drop this course should do so in the first week of classes (before labs begin) so another student can fill the opening.
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. Finally, the course introduces the student to the personal computer using electronic spreadsheet and word processing applications.

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. Hotel elective.
M W F 10:10. M. H. Tabacchi.
Designed especially for students interested in the restaurant industry, particularly health spas and hotels that emphasize physical fitness. The nutrient composition of fresh and processed foods, nutrient handbooks, recommended daily allowances, dietary goals as related to restaurants, nutrition labeling, additives, special diets, fad diets, and weight control are studied. The uses of nutrients and nutrient interactions are emphasized. An excellent elective for upperclass and graduate students.

374 Business Computer Systems Design Fall or spring. 3 credits. Hotel elective. Prerequisite: H Adm 174 or equivalent.
T R 12:20, plus rec to be arranged. R. G. Moore.
This course explores the personal computer as a managerial tool for the hospitality industry. Concepts of modeling, data base, and systems design are covered. Students learn to use specific software applications programs to solve original problems.

771 Graduate Food Chemistry Fall. 4 credits. Required M.P.S. course.
Lecs, M W F 10:10; 3-hour lab to be arranged.
T. Neuhaus.
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 Sanitation in the Food-Service Operation Spring. 2 credits. Required M.P.S. course.
F 10:10–1:10. 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 elementary programming. During the second part of the course, the introduction of the computing machine/information system to the hospitality industry is examined from several viewpoints: data base design, management information system concepts, and actual system application. Students in the course will be given hands-on exposure to various hospitality information systems. The third part introduces the students to the personal computer using electronic spreadsheets and word processing applications.

Economics, Marketing, and Tourism Courses

281 Macroeconomics Spring. 3 credits. Required.
T R 8:30–9:45. C. W. Hart.
Modern economic problems are examined from a historical perspective, as they apply to current events, and as they affect business decisions.

282 Microeconomics Fall. 3 credits. Required.
T R 8:30–9:50. C. W. Hart.
An analytical 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 School of Hotel Administration. 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 is open to all students in the University and will serve as the principal prerequisite for the advanced course.

285 Hotel Sales Fall or spring, 7 weeks only. 2 credits. Limited to 30 students. Hotel elective.
M W 2:30–4:25. W. Prigge.
A seminar in effective sales management with emphasis on convention and group sales. Topics to be covered include sales organization, market determination, selective selling, pricing, internal conflicts, and convention servicing.

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.
This course, taught as a seminar, will utilize cases and attendant readings to help develop abilities in analysis and decision making in hospitality marketing. Topics will include hotels, restaurant, and other service marketing areas—chain and independent.

383 Special Topics in Marketing: Public Relations Fall or spring, 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.
This course will explore the opportunities available through public relations to inform various publics of corporate policies and progress by releases to various media. Includes consumer trade and specialized travel-related publications.

384 Principles of Marketing Fall or spring. 3 credits. Required.
T R 8:15–9:30. L. M. Renaghan.
This course is intended to provide the advanced undergraduate hotel administration student with an overview of the discipline of marketing as it applies to the hospitality industry. The primary aim is to understand how a marketing strategy is devised, especially the interrelationship of company objectives, internal resources, and the external operating environment. A second aim is to show how the special nature of services affects the development of marketing strategies in the hospitality industry. At the completion of the course it is expected that the student will (1) know the terminology of marketing as it applies to the hospitality industry; (2) be able to write and explain a simple consumer decision process model; (3) be able to explain how the behavior of a market of interest is translated into marketing strategy; and (4) be able to analyze a market of interest and develop a suitable marketing strategy to include the appropriate marketing mix.

481 Advertising Strategies Fall, 7 weeks only. 2 credits. Limited to 50 seniors and graduate students. Prerequisite: introductory courses in psychology and marketing or permission of instructor. Hotel elective.
M 1–4:30. P. C. Yesawich.
An advanced course on the development of effective advertising strategies for consumer goods and hospitality services. Lectures will focus on principles drawn from psychology, communication theory, and marketing. Instruction will include the extensive use of slides, audiovisual material, and case histories.

484 Tourism II Fall or spring. 3 credits. Limited to juniors, seniors, and graduate students. Prerequisites: H Adm 281, 282, 284, and 384, or equivalents, or written permission of instructor. Hotel elective.
Lecs, M W F 1:25; lab, (sec 1) M 10:10, (sec 2) 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.

485 International Marketing in the Hospitality Industry Fall. 3 credits. Prerequisites: H Adm 280 and 331. Hotel elective.
Hours to be arranged. W. Kaven.
This course will develop students' understanding of international marketing with emphasis on hospitality-industry applications. It will focus on (1) the similarities and differences that exist between domestic and international marketing and (2) the conduct of international marketing in various segments of the world.

689 Problems and Opportunities in International Hospitality Fall or spring. 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, 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 R 1–2:15. 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. Hotel elective
W 10:10–12:05. 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, turnaround management, 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. Students should obtain permission form from the school office, 137 Statler Hall.* (Occasionally an independent research project can be added after the three-week deadline with support of the faculty sponsor *and* by formal petition.)
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: *written* permission of instructor. *Students should obtain permission form from the school's graduate office.*
Faculty.
As appropriate, graduate students enroll in this course for thesis or monograph research or for other independent directed study. The student must have in mind a project and obtain agreement from an individual faculty member to oversee and direct 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

Professorial

Alvarez, Roy, M.P.S., M.Ed., Cornell U. Asst. Prof.
Arbel, Avner, Ph.D., New York U. Prof.
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.
Gaurnier, 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.
Mutkoski, 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
Stipanuk, David M., M.S., U. of Wisconsin. Asst. 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

Bamford, Carl, A.O.S., Teaching Support Specialist
Compton, Richard A., M.S., Senior Lecturer
D'Aprix, David, B.S., Lecturer
David, Betty B., Lecturer
Degan, Melissa, A.O.S., Teaching Support Specialist
Flash, Dora G., A.B., Lecturer
Lumley, Jane, M.A., Lecturer
McNeill, Keith, B.S., Lecturer
Neuhaus, Thomas W., 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
Oswald, David E., Lecturer
Panarites, Peter, J.D., Visiting Assoc. Prof.
Prigge, William, B.S., Visiting Assoc. Prof.
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, Stephen, B.S., Visiting Lecturer
White, Robert, A.O.S., Teaching Support Specialist
Whitehead, Donald E., B.S., Visiting Lecturer
Yesawich, Peter C., Ph.D., Visiting Assoc. Prof.

New York State College of Human Ecology

Administration

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
Charles McClintock, assistant dean, educational programs and policy
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 buildings include administrative and 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 (counseling office, human development and family studies, human ecology 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.
Policy Analysis	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, and approximately 250 freshmen and 100 transfer students matriculate. One hundred 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. Admission is selective. Three out of four freshmen were in the top 10 percent of their high school graduating classes. Mean Scholastic Aptitude Test (SAT) scores for freshmen accepted in fall 1983 were 564 verbal and 616 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 needs different from those of the average undergraduate. To facilitate the education of mature students, defined as those twenty-four years old or older at matriculation, the college has adopted certain procedures specifically for that group.

Mature students are permitted to enroll for as few as 6 credits without petitioning and are also permitted to extend their residency beyond the normal eight terms.

It is highly recommended that mature students contact Vivian Geller, the director of the Continuing Education Information Center, B12 Ives 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 education and are considering completing degree programs. Students accepted in the non–degree status of special student may enroll for a maximum of two semesters. During the second semester of attendance, a special student must either apply for admission as a transfer or plan to terminate studies in the college at the end of the semester.

Special students are expected to take a minimum of 12 credits each semester and to take one-half to two-thirds of their work in the state divisions of the University. Work taken while 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. 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.

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;
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.

Department Academic Policy

Ownership of Student Work

All drawings, models, paintings, graphic art, sculpture, and apparel design work done in the studios and drafting rooms as part of the instructional program are the property of the department until they have been graded and released by the instructor. Certain works may be selected by the department for retention and display for academic purposes.

Exhibitions of Student Work

Exhibitions of student work will be held each semester as part of the yearly DEA Gallery schedule. These may display the work of a specific course or exhibit examples of the best recent work done. The department is not responsible for loss or theft of student work.

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, and housing. 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-solving 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

Applications for textile structures include advanced engineering composites, protective clothing for industrial and military environments, and biomedical materials, as well as the more traditional applications found in apparel and home furnishings. The textile option provides a strong base in mathematics and the physical sciences combined with supporting courses in engineering, consumer economics, and the social sciences. The program provides excellent preparation for graduate study in many fields, including fiber and polymer science, textile science, textile technology, and textile engineering.

Careers are available in the fiber and textile industries, government, and education. Recent graduates are active in new product development and evaluation, research, technical services, product safety, and consumer information.

Option IV: Apparel and Textile Management

The fields of textiles and apparel, or textiles and interior furnishings, 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 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 throughout the life course. Of equal interest is the family as a context for individual development and as a part of the larger structure of society. An ecological perspective—the person in interaction with complex biological, situational, and environmental conditions of everyday life—is featured in many departmental courses.

Major social 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, social program assistants, etc. The department does not offer programs leading to teaching certification at any level.

Curriculum

HDFS majors usually combine a broad liberal education with a more specialized focus either on a problem of human concern or a substantive area of concentration. 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, nutrition, 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, which 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's Office of Undergraduate Education, NG21 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, human service planning and policy development, 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.

Academic Advising

The curricula in HSS are demanding; each of the HSS options requires breadth and depth in several areas. The core courses—HSS 101 (previously 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

Three options are available in the department: (1) human ecology education, (2) social work, and (3) human service planning and policy development.

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.

The human service planning and policy development option is designed to meet the career needs of students interested in the planning and development of human service programs and policies.

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 101, 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.

Option III: Human Service Planning and Policy Development

Students in this option

1) obtain an interdisciplinary background in the social sciences, taking courses in education, sociology, psychology, and government;
2) study existing human service policies, programs, and delivery systems—how they have evolved, how well they work, and how they change;
3) become familiar with the history of human service planning, planning theory, the settings in which planners work, and the nature of planning and policy development as an activity in which analytical and political skills are equally important;
4) acquire and develop analytical tools and skills, including statistics, research design, use of the computer, and methods for assessing needs and resources, choosing among alternatives, designing programs, and evaluating results;
5) acquire and develop social and political skills, including the ability to understand group and organizational behavior and the operation of local, state, national, and intergovernmental political systems, and to communicate effectively with citizens, professionals, government officials, and others;
6) choose an area of concentration—for example, in health services, social services, education, or housing and the environment—and develop additional specialized knowledge;
7) test their knowledge, explore future job or educational possibilities, and gain practical experience through field study in appropriate agency settings.

The option prepares students for employment as planners in local or regional planning departments, human service planning agencies, and more specialized planning programs in health, mental health, programs for the aging, criminal justice, and other fields. Students from this option may also take positions as analysts or program people in voluntary organizations or direct-service agencies at all levels of government or positions on state or federal legislative staffs.

This option also provides a desirable undergraduate background for graduate education in such fields as urban planning, public administration, health planning, health administration, social work, or law.

Nutritional Sciences

See Division of Nutritional Sciences, pp. 344–345.

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 Policy Analysis

Arising out of the increasingly complex interweaving of the public and private sectors of society is an increased demand for people trained to analyze the consequences of public policies, programs, and proposals for individuals and households, for businesses, and for particular sectors in society. The increased demand is at all levels of government and in business. Not only are policy analysts needed but also in demand are people in management positions with policy analysis skills who can interface with policy analysts. Consequently, the policy analysis option is an excellent prelaw or prebusiness program as well as excellent preparation for policy analyst positions in government and business or for graduate work in the premier public policy programs in the country. Policy analysis involves the combination of knowledge of the economic and political forces at work in both the private and public sectors of our society with statistical, analytical, and evaluation techniques. The economic and political knowledge and the analytical techniques are built on a broad foundation in all the social sciences. Moreover, to ensure maximum program flexibility and to provide students with the opportunity to apply general policy analysis and evaluation skills, each student builds two specific policy fields that are examined in depth. Consumer policy, housing policy, health policy, food and nutrition policy, environmental policy, and international development policy only begin the list of possibilities.

Public policy students also typically make use of opportunities for semester-long internships with the New York State Legislature, in one of the many federal agencies in Washington connected with the Cornell-in-Washington program, or with public or private agencies in New York City in the Field Study Program of the college. Advising coordinator Keith Bryant will be glad to answer questions about the advising system.

Individual Curriculum

A student who has educational and professional objectives that cannot be met satisfactorily within the framework of existing majors in the College of Human Ecology may petition to develop an individual curriculum. To be approved, the curriculum must be within the focus of the college and be interdisciplinary in design, include at least 40 credits in human ecology courses, and not exceed the normal number of credits allowed in the endowed divisions. A student develops an individual curriculum in consultation with faculty advisers from at least two subject-matter fields and the program coordinator.

Such a program of study should encompass a substantial part of the student's undergraduate education and must include at least three semesters. For this reason, a request to follow an individual curriculum should be made as early as possible and must be made before the second semester of the junior year.

If an individual curriculum seems advisable, Barbara Morse, in the Counseling Office, will provide direction in formally developing a program of study. Although the individual curriculum coordinator must sign the green schedule during course enrollment each term, it is the student's responsibility to follow the curriculum as planned or to have any necessary revision approved in writing by his or her advisers and the program coordinator in advance of the program change.

Special Opportunities

Several special programs allow students to receive academic credit for fieldwork and internship experience, to study in absentia, or to enter particular graduate programs after the junior year.

Human Ecology Field Study

Field study enables students to learn from participation in a community and 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. There are opportunities for in absentia study abroad at many overseas universities. See *A Student's Guide to the College of Human Ecology* for procedures for study in absentia. The International Program Office coordinates Denmark's International Study Program at the University of Copenhagen for all Cornell undergraduate students. This program provides the opportunity for a semester or a full academic year in Copenhagen with studies in absentia in the fields of General Studies (Liberal Arts), International Business Studies, or Architecture and Design Studies. Architecture and Design Studies also offers the option of a summer program.

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 college registrar.

Dual-Registration Programs

Graduate School of Management

A limited number of highly qualified students from Cornell undergraduate divisions, including Human Ecology, may be accepted by the Cornell Graduate School of Management after the junior year. Students need the approval of the admissions office and the registrar in the College of Human Ecology. Accepted students should be aware that if the management course work taken in the senior year is in excess of the 21 additional credits allowed in the Cornell endowed divisions, they will be charged for the additional credits on a per-credit basis.

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 registrar.

Cornell Medical College

A limited number of highly qualified students from three Cornell divisions, including the College of Human Ecology, may be accepted by the Cornell Medical College after the junior year. To be considered for this program, the student must have completed 105 credits toward graduation by the end of the junior year. Students also need to plan ahead to ensure that distribution requirements for the Bachelor of Science degree will be met. Accepted students receive 15 credits toward the B.S. degree from their first year of study at the College of Medicine. Interested students should contact the Health Careers Program office in 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 the college registrar, 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, human service planning and program development.

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 Policy Analysis.

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. Students who wish to study abroad may find that many study abroad programs in non-English-speaking countries require the equivalent of two years of college-level lanaguage study. For more detailed information, see the section "Advanced Placement of Freshmen."

Graduation Requirements for the Degree of Bachelor of Science

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). Students should not take Economics 101 *and* CEH 111; Economics 102 *and* CEH 110; or Psychology 101 *and* Education 110; they are equivalent courses.

C. *Additional credits* (12 credits) selected from any subjects listed above or from courses in anthropology (except archaeology); Astronomy 101 or 102; biochemistry; microbiology; genetics and development; Geological Sciences 101; and government.

II. Communication, Analysis, and the Humanities (15 credits)

A. *Freshman 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 Management

Courses in the endowed divisions in this section may not exceed a total of 21 credits.

V. Physical Education (2 credits)

Students who have successfully fulfilled these requirements should have completed at least two terms of physical education in their freshman year.

Related Policies

College course requirement. Freshmen and sophomores are required to enroll in at least one course in the College of Human Ecology 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.

Section IV. *There is no limit to the number of credits that may be taken in the state divisions of Cornell,* and therefore students may choose to take additional state credits and graduate with *more than* 120 credits.

Credits in the endowed divisions in this section may not exceed 21. Any course taken in an endowed division for which a grade of F or U is received will be counted *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.* For the precise fee per credit, students should call the Office of the Bursar.

Related Policies for Transfer Students

Section I-A. Transfers who are entering human ecology programs in consumer economics, 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 is allowed to meet this requirement), based on the status of the student's matriculation and prorated as follows:

Status at Matriculation	*Cornell Human Ecology Credits to Satisfy Work outside the Major*
Freshman (1−25 transfer credits)	15

Sophomore (26–55 transfer credits)	12
Junior (56–85 transfer credits)	9
Senior (86–120 transfer credits)	9

In both options, the courses must be in at least two departments 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

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 college registrar. 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 college registrar for approval to study beyond the usual eight semesters.

Exemptions from Requirements

Students who want an exemption from a specific graduation or major requirement may petition, and approval may be given under certain circumstances. Full information about the petition process is given in the human ecology *Student Guide*. Petition forms are available in the 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 Graduate School of Management 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 chairperson 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 12 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 $50 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. Students who want to study abroad for a single semester or a full year may earn credit for study in absentia. 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 a leave of absence received after the first seven weeks of the semester or requests for a leave of absence from students who have already had two semesters' leave of absence will be referred for action to the Committee on Academic Status. The committee may grant or deny such requests, attaching conditions as it deems necessary. Leaves of absence after the first seven weeks are generally granted only when there are compelling reasons why 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 or severe warning or in good academic standing.

Withdrawal

A withdrawal is a termination of student status at the University. Students may voluntarily withdraw at any time by notifying a counselor 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 offical 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 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 on the student's official transcript, with an asterisk and the final grade received, for the semester in which the student was registered for the course.

A student who completes the work in the required time and expects to receive a grade must take the responsibility for checking with the Office of 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 12:20, plus two 1-hour labs to be arranged. Staff.
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 synthesis. In addition, the course's interdisciplinary approach, featuring reading selections by many members of Cornell Faculty, 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

B. Harding, director

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. There are opportunities for in absentia study abroad at many overseas universities. See *A Student's Guide to the College of Human Ecology* for procedures for study in absentia. The International Program Office coordinates Denmark's International Study Program at the University of Copenhagen for all Cornell undergraduate students. This program provides the opportunity for a semester or a full academic year in Copenhagen with studies in absentia in the fields of General Studies (Liberal Arts), International Business Studies, or Architecture and Design Studies. Architecture and Design Studies also offers the option of a summer program. Interested students should contact the International Program Office in 153 Martha Van Rensselaer Hall.

360 Preparing for International or Intercultural Experience Fall or spring. 2 credits. Prerequisite: two social science courses or permission of instructor. S-U grades optional.
T 2:30-4:25. Staff.
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.

[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. Not offered 1984-85.]

380 Human Ecology: An International Perspective Fall or spring. 3 credits. Limited to 25 students. Prerequisite: one social science course and permission of instructor. Any student who does not attend the first session will be dropped from the course.
W 7:30-10 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

C. McClintock, assistant dean for educational programs and policy
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. Credit 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 educational programs and policy 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. Limited to graduate students recommended by their chairperson and approved by the assistant dean for educational programs and policy and the member of the staff in charge of the problem for independent advanced work. S-U grades optional.
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. Not offered 1984-85.
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 per section. Prerequisite: permission of instructor. Required of all students planning to do field study in the College of Human Ecology for interdepartmental credit.
T R 10:10-12:05 or T R 2:30-4:25. D. Giles.
Introduces students to skills essential for enrichment of field study, internships, and other experiential learning courses. This course focuses on the various cultural settings—small group, organizational, and community—that students will encounter during field study. Through a cycle of active learning and reflection, students gain experience in analysis of assumptions and biases, participant observation and interviewing skills, self-directed learning skills, effective verbal and nonverbal communication, and group dynamics. Working in small task groups, students then apply and synthesize these skills in community-based field projects. Previous semesters' projects include "Collegetown Redevelopment" and "The Culture of Ithaca Commons."

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 or spring. 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 social 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 grass-roots 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 department 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 policy analysis option; H. B. Biesdorf, P. Chi, S. Clemhout, M. Coughlan, J. Gerner, B. Hall, 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, consumer demand, production, market failure, and the calculation of present value.

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 8:40-9:55. E. S. Maynes.
This course introduces students to marketing—the processes and institutions by which products are conceived, tested, priced, advertised, distributed, and evaluated. Case studies and outside lecturers are used to impart reality to the course. Emphasis is given to the viewpoint of both the seller and the consumer. Students are required to undertake a paper involving a marketing problem.

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 or spring. 3 credits. Limited to 35 students; not open to freshmen; preference given to human ecology juniors, seniors, and transfer students. S-U grades optional.
T R 2:30-4. A. Davey.
A systems approach identifies and analyzes basic management concepts. The focus is on the use of resources to attain goals and meet demands. The Personalized System of Instruction format permits self-pacing.

315 Personal Financial Management Fall or spring. 3 credits. Limited to 200 students. Preference given to human ecology students; not open to freshmen. S-U grades optional.
M W F 10:10. Fall: J. Robinson; spring: 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 W K Bryant
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. Prerequisites: CEH 110 or permission of instructor.
T R 2:30-3:45. E. S. Maynes.
This course is designed to help individuals make more effective choices as consumers. In pursuit of this goal, the course introduces the student to relevant concepts, theories, and research from economics, consumer economics, marketing, and statistics. Topics covered include informationally imperfect markets, assessing consumer information, seeking redress, bargaining, dealing with inflation, decision-making rules, the concept and measurement of quality, and consumerism. Students prepare price-quality maps of local consumer markets. A second part of the course introduces the student to the concept of consumer sovereignty and assesses the performance of markets as critiqued by economists and consumerists.

341 Fundamentals of Housing Economics Spring. 3 credits. Prerequisites: CEH 110-111 or equivalent. S-U grades optional.
T R 1-2:15. 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 1 to 2 credits under CEH 600. Prerequisites: CEH 110-111 or equivalent. S-U grades optional.
M W F 9:05. J. Gerner.
The wealth and income positions of American households are defined and described and their economic determinants discussed along with the impacts of tax and expenditure policies and the economics of the political positions for and against such policies.

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 faculty 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. Limited to 20 students; not open to freshmen; preference given to juniors and seniors. Recommended: CEH 312 or equivalent. S-U grades optional. Offered alternate years.
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 Fall 3 credits. Open to juniors, seniors, and graduate students. Prerequisites: CEH 110-111 or permission of instructor. Not offered 1984-85.
T R 2:30-3:45. E. S. Maynes or 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. Offered alternate years.
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.

432 Economic Organization of the Marketplace Fall. 3 credits. Prerequisites: CEH 110 or equivalent.
T R 1-2:15. S. White-Means.
An examination of the decision-making objectives of sellers in markets where consumers purchase products. The course then addresses the impact on consumers of the implementation of strategies to fulfill seller objectives. The role of federal agencies as mediators between sellers and consumers is also considered.

[441 Mortgage and Consumer Credit Finance Spring. 3 credits. Prerequisites: CEH 110-111. S-U grades optional. Offered alternate years. Not offered 1984-85; next offered 1985-86.
T R 10:10-11:25. R. Heck.
This course examines the residential mortgage and consumer credit financing processes, alternative credit instruments, and sources of credit. The differences between the financing mechanisms of the various debt instruments will be emphasized, and their effects on consumer decision making will be studied. The microlevel investment aspects of real estate will be explored in its relationship to the cost

of financing. Issues of delinquency and financial insolvency will be examined with respect to mortgage and consumer credit debt. The financing process will be examined at the microlevel from the perspective of both the institution and the consumer. Finally, the role of credit in the economy and the influence of government policy on the supply of credit will be discussed in relation to the credit decisions of the consumer.]

[443 Social Aspects of Housing and Neighborhood Fall. 3 credits. Prerequisite: CEH 247 or 148. S-U grades optional. Not offered 1984-85.
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. Prerequisite: CEH 247 or permission of instructor. S-U grades optional. Offered alternate years.
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 10:10-11:25. 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, and other governmental policies that deal with housing and the neighborhood environment.

449 Housing Policy and Housing Programs Fall. 3 credits. Prerequisites: CEH 111 or equivalent. S-U grades optional.
M W F 11:15. Staff.
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 Spring. 3 credits. Prerequisite: CEH 110 or equivalent.
T R 1-2:15. 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. Prerequisites: CEH 110 or equivalent. S-U grades optional.
M W F 1:25. W. K. Bryant, J. Gerner.
Economic analysis of the roles played both by the courts and by federal and state regulatory legislation in altering consumer markets, consumer behavior, and consumer welfare. Topics include economic analyses of contract law, products liability, and accident law, as well as of the activities of such agencies as the Federal Trade Commission, the Food and Drug Administration, and the Consumer Product Safety Commission.

472 Community Decision Making Fall. 3 credits. Prerequisite: Government 111 or equivalent. S-U grades optional. Offered alternate years.
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 1984-85.
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 Spring. 3 credits. Prerequisite: an intermediate microeconomic theory course or equivalent. Offered alternate years.
M W F 11:15. Staff.
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 Research Workshop 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. Not offered 1984-85; next offered 1985-86.
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 or spring. 2-3 credits. Recommended: a course in family sociology. S-U grades only.
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.
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 1984-85.
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, 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. Prerequisites: Economics 311 and CEH 626. S-U grades optional.
M W F 10:10. W. K. Bryant, J. Gerner.
Further examination of theoretical and empirical literature concerning market work, human capital formation, 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. Prerequisite: CEH 626 or 627.
W 2-4:25. 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. Antitrust activity, disclosure requirements, advertising restrictions, and regulatory agencies are examined in terms of their ability to serve the public interest or to serve special interests. Economic analysis, rather than institutional structure, is emphasized.

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 1984-85; next offered 1985-86.
T R 10:10-11:25. 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 are 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.
Hours to be arranged. Staff.
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. Not offered 1984-85; next offered 1985-86.
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 live 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. Enrollment limited to 20 students. Open to CEH graduate students and to others with permission of instructor. S-U grades optional. Not offered 1984-85.
Hours to be arranged. 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. Not offered 1984-85; next offered 1985-86.
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. Not offered 1984-85; next offered 1986-87.
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 1984-85.
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, CEH 626 and 627, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1984-85; next offered 1985-86.
M W 1:25-3:20. W. K. Bryant.
Major developments in the theory of household behavior with applications to consumption, saving, demand, and expenditure behavior of households.]

727 Human Capital Fall. 3 credits. Prerequisite: permission of instructor. Recommended but not required: CEH 411. S-U grades optional. Offered alternate years.
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 1984-85.
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 faculty.

Design and Environmental Analysis Courses

W. R. Sims, chairman; S. K. Obendorf, graduate faculty representative; A. Racine, undergraduate advising coordinator; G. Atkin, F. D. Becker, R. Beckman, M. Boyd, A. Bushnell, C. C. Chu, P. Eshelman, C. E. Garner, S. Hester, J. LaQuatra, A. T. Lemley, W. J. McLean, L. Mankowski, G. C. Millican, E. R. Ostrander, M. E. Purchase, P. Schwartz, G. Sloan, C. Straight, S. S. Watkins, M. W. White, 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 two-dimensional 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. Priority given to interior design majors. Prerequisites: 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 studio course in three-dimensional design with an interior design emphasis. Problems in spatial organization are explored through drawings and models.

111 Theory of Design Spring. 3 credits. Enrollment limited to 120 students. Priority given to DEA majors.
M W F 11:15. R. Beckman.
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 18 students. Priority given to DEA majors. Minimum cost of materials, $50.
M W 10:10-1:10 or 7:30-10:30 p.m. Staff.
A studio drawing course for designers. Discussion groups on the drawing techniques are held to develop a visual understanding and vocabulary. The student is introduced to the functions of line, shape, and value. Perspective, spatial, and conceptual drawing are emphasized.

117 Drawing the Clothed Figure Spring. 3 credits. Enrollment limited to 25 students. Priority given to DEA option 2 and 3 majors. Prerequisites: DEA 115 or equivalent. S-U grades optional. Approximate cost of textbook, $30; supplies, $40.
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.

135 Introduction to Textiles 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.
S. K. Obendorf.
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, $80; lab fee, $5.
Fall: lecs and labs, T R 1:25-4:25. Spring: lecs and labs, T R 1:25-4:25. 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.
M W F 12:20-1:10. F. Becker, E. Ostrander, B. Sims, G. Sloan.
Introduction to influence of physical environment on human behavior. Topics include environmental influences on social behaviors such as crowding, community, crime, and friendship; environmental needs associated with social characteristics such as stages in life cycle, life styles, social class, family structures, and handicaps; person-environment fit for lighting, acoustics, and thermal comfort; introduction to human factors and systems analysis; effects of environmental form on perception-cognition, dynamics of collaboration; user-responsive design; participatory design; programming; and postoccupancy evaluation.

201 Design III: Basic Interior Design Fall. 5 credits. Each section limited to 18 students. Prerequisites: DEA 101 and 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; diazo machine fee, $8.
M 2:30-4:25 and T W R 1:25-4:25. A. Bushnell, P. Eshelman.
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; diazo machine fee, $8.
M 2:30-4:25 and T W R 1:25-4:25. A. Bushnell, P. Eshelman.
Second interior design studio. Emphasis of the course is on continued development of basic proficiency in design skills through exposure to a selected set of interior and interior-product design problems of limited complexity. Each problem of 3 to 5 weeks duration is structured to emphasize different aspects of the design process.

203 Design Communications Fall. 1 credit. Enrollment limited to 40 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 representational 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. Not offered 1984-85; next offered 1985-86.
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
T R 10:10-11:30. A. T. Lemley.
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, toxic wastes, and risks and regulations. Course relates principles of the natural sciences to decisions that people must make about their environment.

238 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.

240 Clothing through the Life Cycle Spring. 3 credits. Open to freshmen, sophomores, and DEA transfers; others with permission of instructor. Lab fee, $5.
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 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.
T R 10:10-11:30. A. Racine.
An historical survey of American women's dress from the 1700s to the present day and the sociocultural forces that affected women's development within the social classes. The Cornell Costume Collection and illustrated lectures are used. Term paper topics deal with the impact of dress on cultural assimilation of immigrant women.

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. Exercises apply environmental form influences on social behavior such as aggression, cooperation, community, and crime. Also covers the influence of stage in life cycle, family structure, and social class on environmental needs and purposes. Implications for the planning, design, and management of complex environments such as offices, hospitals, schools, and housing are emphasized.

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 or equivalent and 240. Apparel design majors should take DEA 264 and 367 in the same academic year. Minimum cost of materials, $80; 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, and 204. Corequisite: DEA 303. Recommended: DEA 459. Minimum cost of materials, $120; shop fee, $10; optional field trip, approximately $60; diazo machine fee, $8.
W 2:30-4:25 and M T R 1:25-4:25. R. Beckman.
Intermediate-level interior design studio. The course is organized around a series of interior and interior-product design problems of intermediate-level complexity, 3 to 5 weeks in duration. Focus is on development of design skills and on understanding of a selected set of generic problem types.

302 Design VI: Intermediate Interior Design Spring. 5 credits. Prerequisites: DEA 301, 303. Corequisite: DEA 304. Minimum cost of materials, $120; shop fee, $10; diazo machine fee, $8.
W 2:30-4:25 and M T R 1:25-4:25. Staff.
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.
W 1:25. R. Beckman.
Basic understanding of furniture types and systems; interior products and equipment such as work stations; window, wall, and floor coverings; ceiling and lighting systems; and materials and finishes. Emphasis is placed on criteria for selection of furnishings, materials, and finishes for typical interior design and facility management problems.

304 Introduction to Professional Practice of Interior Design Spring. 1 credit.
W 1:25. R. Beckman.
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 Spring. 3 credits. Recommended: DEA 150.
M W F 12:20. 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: one of the following courses: Nutritional Sciences 146, DEA 135, DEA 230, CEH 312, or CEH 332. S-U grades optional. Offered alternate years.
Lecs, M F 2:30; lab, 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.

331 The Textile and Apparel Industries Fall. 3 credits. Prerequisites: Economics 101 and 102 or CEH 110 and 111 and an upper-division course in either apparel or textiles, excluding field experiences. Recommended: Economics 361.
T R 8:30-9:55. S. Hester.
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, safety, and the environment. The role of labor unions is examined, as well as the effects of international trade in textile and apparel products.

337 Fabric Technology Spring. 3 credits. Prerequisite: DEA 135.
Lec, T R 10:10-11:30. 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.

[343 Design: Introductory Textile Printing Fall 3 credits. Each section limited to 15 students. Priority given to DEA majors. Prerequisites: DEA 101 and at least one other studio design course. Minimum cost of materials, $50. Not offered 1984-85.
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. Not offered 1984-85.
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. Not offered 1984-85.
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 Fall. 3 credits. Recommended: DEA 150.
T R 10:10-11:30. 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.

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 or equivalent, 240, and 264 or permission of instructor. Corequisites: DEA 337 and 117. Apparel design majors should take DEA 264 and 367 in the same academic year. Minimum cost of materials, $80; 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.

431 The Textile and Apparel Industries—Field Experiences Second week of January intersession. 1 credit. Prerequisite or corequisite: DEA 331. S-U grades only. Offered alternate years. Students are responsible for trip expenses, approximately $300.
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.

[432 Textile Testing and Evaluation Fall. 3 credits. Prerequisites: DEA 337 and statistics. Not offered 1984-85; offered alternate years beginning 1985-86.
Lec, W 11:15; lab, F 12:30-3:20. P. Schwartz.
This course covers the physical and performance evaluation of textile fabrics. Lectures will cover the theory and philosophy of textile testing methods related to fabrics and will include statistical procedures for the evaluation of test data. Students will use textile testing equipment in a laboratory setting. MINITAB will be used for the analysis of test data.]

433 Textile Structure and Properties Spring. 4 credits. Prerequisites: DEA 436 and Physics 101, 112, or 207.
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.

434 Care of Textiles Fall. 2 credits. Prerequisite: DEA 337. Not open to students who have taken DEA 230.
Lec, F 9:05; lab, W 8. 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 Textile Chemistry Fall. 3 or 4 credits Prerequisites: DEA 432, and Chemistry 253 and 251 or Chemistry 357-358 and 251.
Lecs, M W F 12:20; lab, R 12:20-3:20.
S. K. Obendorf.
A study of polymer structure and organic polymerization reactions of the major classes of textile fibers. Laboratories include considerations of the reactions and properties of textile fibers and the application of instrumentation to the characterization of textile substrates.

438 Apparel Textiles Fall. 3 credits. Prerequisites: DEA 337 and 264, or permission of instructor. S-U grades optional.
M W F 2:30. 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 432 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; field trip, $125.
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, and 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 research design, 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, E. Ostrander.
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, $80; 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. DEA 640 cannot be substituted for 499. Minimum cost of materials, $120; diazo machine fee, $8 per semester.
T R 1:25-4:25. Staff.
A comprehensive design-problem-solving experience involving completion of an advanced interior design problem selected by the student and approved by the instructor. The course is structured around five phases of activity, each lasting three to four weeks: environmental assessment and programming, generation of alternative designs, evaluation of alternatives, development and refinement of the selected alternative, design of implementation measures, and the preparation of a professional-quality design report.

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 chairperson and approved by the head of the department and instructor.

[621 Textile-Fiber Evaluation Spring. 3 credits. Prerequisites: DEA 433 or 436 or permission of instructor. S-U grades optional. Not offered 1984-85.
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 Fall or spring. 1-3 credits (variable). Prerequisite: permission of instructor. May not be offered every term.
Hours to be arranged. Staff.
An in-depth study of one or more selected topics in polymers, fibers, or textiles, such as comfort, fabric formation, and flammability. The course content will vary; consult instructor for more details.

[636 Advanced Textile Chemistry Spring. 4 credits. Prerequisite: DEA 436. Offered alternate years. Not offered 1984-85.
The chemistry and physiochemical 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, and topics of major concern to the field of textiles are discussed by faculty members, students, and guests from industry, government, and academia. Students electing to take the seminar for credit are required to write a paper in the first term, to present a proposal for independent investigation in the second term, and to report on their findings in the third or fourth term.

639 Mechanics of Fibrous Structures Fall. 3 credits. Prerequisites: DEA 433 or permission of instructor. Offered alternate years.
T R 10:10-11:30. 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. May not be substituted for DEA 499 or for other requirements for the major by students in the Interior Design option. Approximate cost of materials, $100; diazo machine fee, $8.
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. Limited to graduate students. Open to advanced undergraduates who have permission of instructor. S-U grades optional.
Hours to be arranged. V. White.
Provides 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).

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 exposure 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 and Office Design Spring. 3 credits. Prerequisite: DEA 250 or permission of instructor.
T R 12:20-2:15. F. Becker.
Intended for students interested in the management and administration of organizations and/or their design. Examination of influence of office design on 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, and social forces underlying the development of office environments, including office standards and planning processes is considered. Emphasis is on implications for the planning, design, and management of office environments.

654 Facility Planning and Management Studio Spring. 4 credits. Prerequisites: DEA 660, 350. Corequisite: DEA 459. Letter grades only. Minimum cost of materials, $100.
T R 2:30-5:30. W. Sims.
Intended for graduate and advanced undergraduate students interested in facility planning and management. The purpose is to provide students with a working knowledge of basic tools, techniques, and concepts useful in solving recurring problems in the planning, design, and management of complex facilities. These problems include development and implementation of space standards, space allocation policies, space forecasting, facility change, selection, space planning and design, furniture specifications, and management of departmental moves. Social-psychological, organizational, financial, architectural, and legal factors will be considered. Expertise is developed through projects, readings, lectures, and discussions.

656 Research Methods in Human-Environment Relations Spring. 4 credits. Prerequisites: DEA 150 or permission of instructor, and a statistics course. Letter grades only.
M W F 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 additonal hour each week.

659 Seminar on Facility Planning and Management Fall. 1 credit. For graduate students and advanced undergraduates interested in careers in facility planning and management. S-U grades only.
Hours to be arranged. Staff.
Series of seminars led by Cornell faculty members and other professionals directly involved in the facility planning and management field. Topics include strategic space planning, space standards, office automation, project management, energy conservation, building systems, wire management, and lighting and acoustics.

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.

899 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; R. Savin-Williams, coodinator of undergraduate education; M. Basseches, H. T. M. Bayer, W. L. Brittain, U. Bronfenbrenner, J. Brumberg, S. Ceci, M. Cochran, J. Condry, S. Cornelius, J. Doris, J. Eckenrode, H. Feldman, J. Gebhardt, S. Gillis, S. Hamilton, J. Harding, C. Howard, E. Kain, L. C. Lee, B. Lust, P. Moen, M. Potts, P. Schoggen, G. Suci, E. Walker, S. West, P. Ziegler

111 Observation Fall. 3 credits. Not open to first-semester freshmen.
M W F 10:10. 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 Spring 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 2:30-4:25. 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 grade 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.

150 The Family in Modern Society Fall or summer. 3 credits. S-U grades optional.
M W F 1:25. E. Kain.
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 or spring. 3 credits. Human ecology students must register for HDFS 201.
Fall: M W F 11:15; spring: M W F 10:10.
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 1984-85.
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. Not offered 1984-85.
T R 2:30-3:45. M. Basseches.
Explores effects on the 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 or 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.
W 12:20-2:15, 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) Spring. 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 structures, and American society is also discussed.

[270 Atypical Development Spring. 3 credits. Prerequisites: HDFS 115, Psychology 101, or Education 110 Not offered 1984-85.
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.

[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 1984-85.
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.]

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 1984-85.
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 are also studied.]

[344 Infant Behavior and Development Spring. 3 credits. Prerequisite: HDFS 115 or equivalent. Not offered 1984-85.
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. Not offered 1984-85.
W 7:30-9 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 or 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 Families 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 1:25. 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. Prerequisite: HDFS 150. 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. Prerequisites: HDFS 150 or one 200-level social science or history course. S-U grades optional. Human ecology students must register for HDFS 359.
T R 10:10-11:40. J. Brumberg.
This course provides an introduction to, and overview of, problems and issues in the historical literature on American families and the family life cycle. Reading and lectures demonstrate the pattern of American family experience in the past, focusing on class, ethnicity, sex, and region as important variables. Analysis of the private world of the family deals with changing cultural conceptions of sexuality, sex roles, generational relationships, stages of life, and life events. Students are required to do a major research paper on the history of their family, covering at least two generations and demonstrating their ability to integrate life-course development theory, data drawn from the social sciences, and historical circumstances.

[360 Personality Development in Childhood Spring. 3 credits. Prerequisites: HDFS 115 or Psychology 101, plus one other course in HDFS or psychology. Not offered 1984-85.
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.
M W F 11:15. J. Condry.
Issues in the development of social behavior are viewed from the perspective of theory and research. An attempt is made to apply our understanding of social behavior to education, 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 1984-85.
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. Prerequisites: HDFS 117 and Biological Sciences 109-110 or equivalent.
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 credit. 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 or 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. Not offered 1984-85.
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. Not offered 1984-85.
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 instructor. S-U grades optional. Offered alternate years.
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 1984-85.
Hours to be arranged. 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.
R 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 Cognitive Development and Education Fall. 3 credits. Prerequisite: HDFS 115 or equivalent.
T 12:20-2:15. 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. Not offered 1984-85.
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 the development of intelligence. The course reviews Genevan research on development of object permanence, the development of logic, number, and scientific thinking. Research on representation, through mental imagery and language, for example, is also discussed, as are current attempts to extend Piagetian theory to educational practice. Related critical research in these areas is also considered throughout in a supplementary, contrastive manner. Laboratory (HDFS 435) may be possible.]

436 Language Development (also Psychology 436 and Linguistics 436) Spring. 4 credits. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive

development, or linguistics. Recommended: a course in linguistics. S-U grades optional. Offered alternate years.
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 is 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 2:30-4:25. B. Koslowski.
The course will examine the areas of logical thinking (in formal as well as real-world contexts), the process of making logical and "natural" inferences, 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 8-1 or 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.

456 Families and Social Policy Fall. 3–4 credits. On campus and in Washington. Prerequisite: one course in the area of the family or in sociology. S-U grades optional.
T R 10:10–11:30. 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.

481 Introduction to Ecological Psychology Spring. 3 credits. Limited to graduate and upper-division undergraduate students. Prerequisite: permission of instructor. Letter grades only.
M W F 10:10. P. Schoggen.
This is a broad survey of the theory, concepts, methods, and empirical research in ecological psychology, the study of molar human behavior in relation to the naturally occurring molar environment of everyday life. The first part of the course examines the problem of observing, recording, and analyzing the continuous stream of individual behavior under natural conditions, with special concern for child behavior and development. The rest of the course is devoted to the study of behavior settings, the immediate environmental contexts of molar human behavior. We will be particularly concerned with the usefulness of behavior settings in empirical studies of person-environment interaction at all stages of the life course from infancy through old age. A course description with typical readings is available from the instructor.

488 Development in Context (also Psychology 488) Fall. 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.
W F 1:25-3:20. 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 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.

General Courses

617 Adolescence Fall. 3 credits.
Hours to be arranged. 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 Fall. 3 credits.
T 1:30-4. 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. Not offered 1984-85.
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. P. Moen.
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 Spring 3 credits.
Hours to be arranged. 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.

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. Credit 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 chairperson 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; R. J. Babcock, graduate faculty representative; E. Conway, undergraduate advising coordinator; A. Hahn, undergraduate advising coordinator for human service planning and policy development option; J. Allen, H. Brown, J. Ford, J. Greene, I. Lazar, C. C. McClintock, C. A. McLennan, M. Minot, B. J. Mueller, L. A. Noble, A. Parrot, C. Reed, D. Ritchie, C. Shapiro, L. Street, D. Tobias, W. Trochim, B. L. Yerka, J. Ziegler

101 (previously 202) Human Services in Contemporary Society Fall. 3 credits.
M W F 10:10. D. Barr
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 Spring. 3 credits.
M W F 10:10. B. Babcock.
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 F 11:15-12:05. 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.

280 Racism in American Society Fall. 3 credits.
Hours to be arranged. J. Turner, R. Harris, D. Barr.
The purpose of this course is to explore the historical, political, and sociological dimensions of racism in American society. A major goal will be to understand the presence and persistence of racial inequality and the relationship of human services to the problems of racism.

292 Research Design and Analysis Fall. 3 credits.
T R 2:30-3:45. W. Trochim.
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.

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 200 juniors and seniors. Prerequisites: an introductory course in human development and family studies, psychology, or sociology (or equivalent social science course). Recommended: one course in biology. S-U grades optional.
T R 1:25; sec to be arranged. Evening prelims.
A. Parrot.
The aim of this course is to provide students with an understanding of the interactions and interrelationships of human behavior that influence sexual development and behavior. There will be a social policy orientation focusing on the evolution of sexual norms, customs, and legislation within changing sociopolitical systems. Biological developmental components of human sexuality will also be addressed. An underlying issue is the influence of our social and cultural system on the development of sexual needs, standards, and values. Research and theory in human sexuality will be explored in an interdisciplinary approach drawing on human and organizational behavior, biology, history, communication arts, education, research theory, law, sociology, and psychology. 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.
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.
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.
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.

360 Introduction to Human Service Planning
Fall. 3 credits.
T R 10:10-11:30. A. Hahn.
An introduction to human service planning as a field of work. The course will cover the history of human service planning, an overview of planning theories or models and their relationships to planning practice, and a survey of human service planning practice in a variety of settings. Major attention will be given to the intermingling of analytical and sociopolitical skills in planning.

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 (also Education 482) Fall. 3 credits. S-U grades optional.
T R 10:10-12:05. D. Deshler.
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 1984-85.
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. Prerequisite: permission of instructor.
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 Social Planning for the Elderly Spring. 3 credits. Prerequisite: a course in human development, sociology, or psychology. S-U grades optional. Not offered 1984-85.
T R 2:30-4. H. Brown.
Social policies based on the Older Americans Act and Amendments will be examined along with an overview of social gerontology. Opportunity will be provided to study a specific program for the elderly or programs for specific subpopulations of the elderly.]

439 Program Planning for Educational Programs and Services 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 or organization and of education; the psychology of learning; inter- and intraorganizational structures and cooperation; human and fiscal resources; and evaluation planning.

441 Preparation for Internship in Human Ecology Education Fall, weeks 1-7. 2 credits. Limited to students completing human ecology education requirements. 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 hours to be arranged during independent study week. E. Conway.
An orientation for the internship in education. Major topics interrelated are development and management of learning environments, evaluation of the teaching-learning processes in relation to personal goals and unit objectives, philosophy, creativity and teaching techniques, professionalism, and networking. Selected materials for the internship will be developed.

442 Internship in Human Ecology Education Fall, weeks 8-14. 4-6 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, E. Conway.
A guided internship experience with students assigned to cooperating community agencies. Students and faculty work closely together in selecting internship placements appropriate to the various career clusters and individual student interests. Those students completing teacher certification requirements will have a 6-credit internship in a school setting. Internships 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. Staff.
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.
R 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. E. Conway.
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 Human Ecology 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.
E. Conway.
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.

460 Human Service Planning Methods Spring. 3 credits. Prerequisite: HSS 292.
M W F 1:25. H. Brown.
The course is designed to bridge theory-oriented social planning courses and practicums. It is

intended to introduce undergraduates to basic tools and techniques that social planners use. Five modules are included that explain and provide experience in how social planners collect, analyze, and synthesize information and data in planning and policy development in the human services and that take into account the political and social contexts of the process.

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. A lab fee for field-related expenses will be charged to every student in the course. Each student must have a current driver's license.

471 Social Work Practice I Fall. 9 credits. Limited to 25 social work students. Prerequisites: introductory psychology, introductory sociology, one course in human development, grades of C+ or better in HSS 246 and 370, and permission of instructor before registration.
Lecs, M W 10:10-12:05; fieldwork, T R for 8 hours each day. C. Shapiro, D. Ritchie.

472 Social Work Practice II Spring. 9 credits. Limited to 25 social work students. Prerequisites: grade of B- or better in HSS 471 and satisfactory performance in fieldwork.
Lecs, M W 10:10-12:05; fieldwork, T R for 8 hours each day. C. Shapiro, D. Ritchie.

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 Program Development in Social Services Fall. 3 credits. Limited to sophomores, juniors, and seniors.
M W 3:35-4:50. Staff.
The course will introduce students to program development concepts and processes. The demographic, geographic, economic, and public health components of program development will be discussed. The students will be given specific planning assignments and asked to work in 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. Staff.
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. Brown.
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, and 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. Not offered 1984-85; next offered 1985-86.
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.
W 1:25-4:25. D. Tobias.
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. J. Allen.
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. Not offered 1984-85; next offered 1985-86.
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.]

662 (previously 580) Introduction to Public Health 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.

663 (previously 581) Planning Public Health Programs Spring. 4 credits. S-U grades optional.
M W F 10:10. Staff.
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.

[664 The Intergovernmental System and Human Service Program Planning Fall. 3 credits. S-U grades optional. Offered alternate years. Not offered 1984-85; next offered 1985-86.
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. J. Greene.
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. J. Greene.
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. 4 credits per semester. 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. Not offered 1984-85; next offered 1985-86.
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.
Hours to be arranged. W. Trochim.
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 691 or equivalent. Offered alternate years.
T R 1:25-2:40. J. Greene.
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 or participants, and the ethics of qualitative research approaches. It is the aim of the course to identify those settings and researchable questions where such a methodology is most appropriate.

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. W. 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, and developments in higher education in the human services. Two or more human services are examined.

668 Practicum in Program Planning and Development Spring.
W 7:30-10 p.m. I. Lazar.
Activities include preparing plans, organizational change, and developing resources and community support.

669 Seminar in Program Planning and Development Fall.
W 7:30-10 p.m. I. Lazar.
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.

Nutritional Sciences Courses

See course descriptions under Division of Nutritional Sciences, pp. 345–349.

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 O., 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
Brown, Helen W., Ph.D., Iowa State U. Asst. Prof., Human Services 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
Bushnell, Allen R., M.F.A., Cranbrook Acad. of Art. Assoc. 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. Asst. 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., 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
Eckenrode, John J., Ph.D., Tufts U. Asst. Prof., Human Development and Family Studies
Elder, Glen H., Ph.D., U. of North Carolina. Prof., Human Development and Family Studies
Eshelman, Paul E., M.F.A., U. of Illinois. Assoc. Prof., Design and Environmental Analysis
Feldman, Harold, Ph.D., U. of Michigan. Prof. Emeritus, Human Development and Family Studies
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
Greene, Jennifer C., Ph.D., Stanford U. Asst. Prof., Human Service Studies
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. Assoc. Prof., Human Development and Family Studies
Harding, John S., Ph.D., Harvard U. Prof., Human Development and Family Studies
Heck, Ramona K. Z., Ph D., Purdue U. Asst. Prof., Consumer Economics and Housing
Hester, Susan B., Ph.D., Virginia Polytechnic Inst. and State U. Asst. Prof., Design and Environmental Analysis
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
Kremer, Andre, Ph.D., U. of Groningen (Netherlands). Visiting Assoc. Prof., Design and Environmental Analysis
Lazar, Irving, Ph.D., Columbia U. Prof., Human Service Studies
Lee, Lee C., Ph D., Ohio State U. Assoc. Prof., Human Development and Family Studies
Lemley, Ann T., Ph.D., Cornell U. 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
Maynes, E. Scott, Ph.D., U. of Michigan. Prof., Consumer Economics and Housing
Millican, G. Cory, M.F.A., U. of Florida. Assoc. Prof., Design and Environmental Analysis
Minot, Marion E., Ph.D., Cornell U. Prof., Human Service Studies
Moen, Phyllis, Ph.D., U. of Minnesota. Asst. Prof., Human Development and Family Studies
Mueller, B. Jeanne, Ph.D., U. of Wisconsin. Prof., Human Service Studies
Noble, Lucinda A., Ph.D., U. of North Carolina. Prof., Human Service Studies
Obendorf, Sharon K., 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 B., Ph.D., Syracuse U. Asst. Prof., Consumer Economics and Housing
Potts, Marion H., 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. Prof., Design and Environmental Analysis/Consumer Economics and Housing
Savin-Williams, Richard C., Ph.D., U. of Chicago. Assoc. Prof., Human Development and Family Studies
Schoggen, Phil, Ph.D., U. of Kansas. Prof., Human Development and Family Studies
Schwartz, Peter, Ph.D., North Carolina State U. Asst. Prof., Design and Environmental Analysis
Shapiro, Constance H., Ph.D., Cornell U. Assoc. 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, M.F.A., U. of Colorado. Prof., Design and Environmental Analysis
Street, Lloyd C., Ph.D., U. of California atBerkeley. 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 F., 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
White-Means, Shelley I., Ph.D., Northwestern U. Asst. Prof., Consumer Economics and Housing
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
Zorn, Peter M., Ph.D., 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
Jonathon Levy, assistant dean, school relations
James E. McPherson, assistant dean, Office of Student Services
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

	Degree
Industrial and Labor Relations	B.S.

The School

The School of Industrial and Labor Relations at Cornell (ILR) is a small school within a large university, and it tries to maintain the small-college atmosphere that would be expected of an institution that has about 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 fully in its programs.

Almost half of the school's typical freshman class comes from the greater New York City area. Another 30 percent live in other parts of New York State. Students from other states and a few from foreign countries make up the rest of the class. 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) resident instruction, (2) extension and public service, (3) research, and (4) publications. It provides instruction to undergraduates and graduate students who are preparing for careers in the field, as well as to men and women already engaged in industrial relations activities and the general public through its Extension and Public Service Division.

The school's Conference Center, part of the extension division, initiates and hosts conferences covering the full scope of industrial and labor relations. The center provides continuing education and information to practitioners and scholars.

The Research Division develops materials for resident and extension teaching and originates studies in industrial and labor relations. The Publications Division publishes and distributes the research results.

Departments of Instruction

Courses in the school are organized into six departments:

Collective Bargaining, Labor Law, and Labor History 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 Student Services, 101 Ives Hall.

Resident Instruction

This division conducts the on-campus programs leading to the degrees of Bachelor of Science, Master of Industrial and Labor Relations, Master of Science, and Doctor of Philosophy from Cornell.

Office of Student Services

Staff members from the Office of Student Services, 101 Ives Hall, work closely with faculty and faculty committees to administer degree programs for the school. The office's responsibilities include the admitting and orienting of new students, maintaining students' personal and academic records, counseling students on personal and academic problems, and administering the school's financial aid programs. The office also works closely with seniors who are planning graduate study.

Counseling and Advising

New students will be provided advising on orientation, academic procedures, and course registration by counselors in the Office of Student Services.

Each of the school's academic departments names 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 Student Services.

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 Management, earning their bachelor's degree in ILR and a master's degree in the Graduate School of Management after five years of study.

Some students elect to spend a semester in New York City, Albany, or Washington, D.C., with a chance to observe actual labor problem solving as interns in congressional offices, labor organizatiions, personnel offices, and state and federal agencies. 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 and elsewhere in New York State.

The ILR program allows juniors and seniors who want to conduct their own research to receive course credit for individually directed studies if the program is supervised by a faculty member.

Study in Absentia

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 university or school that offers a program unavailable at Cornell. Eligibility requires good standing and approval of study plans by the director of student services. Course work taken in absentia is usually not evaluated for transfer credit until the work has been completed and the student has returned to the school. Students then submit a course syllabus and other evidence of content to the chairman of the department that might have offered the respective course, or to a counselor in the Office of Student Services if the course is more appropriate as a general elective.

Leave of Absence or Withdrawal

If a student desires to withdraw or to take a leave of absence from the University, an interview should be scheduled with a counselor in the Office of Student Services. Counselors will assist students in petitioning for 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

(55 credits)

The curriculum prescribes the courses and subjects listed in the table below, to be taken in the terms indicated during the freshman, sophomore, and junior years. In the senior year, all courses will be electives.

Course or Subject	*Credits*	*Term*
Freshman year		
Freshman Seminars*	6	Fall and spring
Econ 101–102, Micro, Macro Economics*	6	Fall and spring
Psych 101, Introduction to Psychology*	3	Fall
I&LR 100, History of Industrial Relations in the United States	3	Fall
I&LR 120, Macro Organizational Behavior and Analysis	3	Fall
I&LR 210, Statistics I	4	Spring
Any *two* of the following:	6	Spring
I&LR 101, Special Studies in the History of Industrial Relations in the United States		
I&LR 140, Development of Economic Institutions		
I&LR 121, Micro Organizational Behavior and Analysis		
Physical education	0	Fall and spring
Sophomore year		
I&LR 201, Labor Relations Law and Legislation	3	Fall
I&LR 240, Economics of Wages and Employment	3	Fall
I&LR 211, Statistics II	3	Fall
I&LR 260, Personnel Management	3	Fall or spring
I&LR 200, Collective Bargaining	3	Spring†
Ag Ec 221, Accounting‡	3	Spring
I&LR 101 *or* I&LR 140 *or* I&LR 121	3	Spring
Junior year		
I&LR 340, Economic Security	3	Fall

*College of Arts and Sciences.
†May be postponed until fall of the junior year.
‡College of Agriculture and Life Sciences.

Elective Courses

(65 credits)

From the courses offered by the school, students must select a minimum of 27 credits of ILR elective courses. No more than 8 of these credits may be satisfied by I&LR 499, Directed Studies, or I&LR 497–498, Internships, or I&LR 495, Honors Program.

Undergraduates are expected to select one course in the humanities and one intensive writing course (each for a minimum of three credits) from a list of courses designated for completion during the sophomore, junior, or senior years.

The remaining 32 credits may be selectd 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 Management; the College of Engineering; and the School of Hotel Administration) will be billed for the additional tuition at the current cost per credit.

The number of credits that may be taken in the endowed colleges at no additional cost to the student may be changed at any time by official action of the school.

Scheduling and Attendance

Schedule Changes

Occasionally it may be necessary for a student to request changes in his or her course schedule either before a term begins or during the semester. Such requests *must be directed to the Office of Student Services* 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 Student Services. 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 the 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 Student Services *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 Student Services 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 Student Services, 101 Ives Hall.

Dean's List

A Dean's List is compiled for each of the four undergraduate classes each term on the seventh day following receipt of final grades from the registrar. Eligibility for the Dean's List is determined by applying all of the following criteria:

1) achievement of a term average for freshmen of 3.3 or better; for sophomores of 3.4 or better; and for juniors and seniors of 3.6 or better
2) a minimum course load for the term of 12 letter-graded credits
3) completion of all courses registered for at the beginning of the term
4) satisfaction of all good-standing requirements

Academic Standing

Good standing requires that all of the following criteria be met at the end of each term:

1) an average of C– (1.7) for the semester's work, including a minimum of 8 completed and 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 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 reaons 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 Student Services. Counselors will explore the program with students to help them decide if it suits their interests.

Dual Registration in the Graduate School of Management

Dual informal registration in the Graduate School of Management (CGSM) leads to a Bachelor of Science degree in industrial and labor relations and a master's degree in management after five years of study and is open to students who meet the requirements of the Graduate School of Management.

Early planning by each student, preferably in the sophomore year, is desirable to ensure that CGSM expectations and ILR curriculum requirements are fulfilled. Students interested in the very limited and selective program of the Graduate School of Management should contact the Admissions Office, 319 Malott Hall, and a counselor at the Office of Student Services.

Five-Year Master of Science Degree Program

With early planning it is possible to earn the M.S. degree in a fifth year of study. This program is designed specifically for those who wish concentrated study in an area of specialization in the school for a Master of Science degree.

Students considering this program should consult a counselor in the Office of Student Services after their freshman year.

Internships

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 Student Services.

Study Abroad

Students with good academic records may receive permission to register in absentia to study abroad. Numerous programs sponsored by other universities are available. ILR students have studied primarily at the London School of Economics and Tel Aviv University. SUNY colleges and universities sponsor many programs around the world. Information on these programs and many others is available at the Career Center. Some study abroad programs in non-English-speaking countries require language proficiency.

Students should consult the Office of Student Services for assistance in finding and selecting a program as well as for information on in absentia procedures and credit evaluation.

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, G. Korman R. Lieberwitz, L. Mishel, J. Morris, A. Nash, C. Rehmus, 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, 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, R. Seeber.
Study and anaylsis of the structure and operations of American unions, including the complicated internal life of the organizations: the varied environments in which unions develop and grow or decline; the relationship of national unions, local unions, and members in the many different aspects of internal union government; the ways in which unions are set up to handle organizing, collective bargaining, contract administration, and political activity; and the widespread movement toward merger and consolidation of unions that began in the sixties and continues today. All of these will involve a study of union constitutions and other primary documents, in addition to secondary readings. Attention will be given to relevant legislation, current problems of unions, and the eternal problems of attaining union democracy.

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. Limited to upperclass students who have demonstrated ability to undertake independent work and who have received permission of the instructor. Prerequisite: I&LR 101.
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 dicussion.

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, weeks 1–7. 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 organzing and proposed amendments to that law. Includes an examination and a research paper.

403 The Law of Workers' Compensation Fall. 3 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.
Intended to introduce the student to the history of the black worker in the United States through a review and analysis of the existing literature of black labor history and through source documents from the National Archives. Discussions will center around the black worker in agriculture, industry, and government; black worker migrations; black workers and organized labor; and black workers, discrimination, and the law.

407 Contemporary Trade Union Movement Fall. 3 credits. Prerequisites: I&LR 100 or 502, upperclass standing.
N. Salvatore.
An examination of contemporary trade union issues in the context of labor's history since World War II. Among the issues to be discussed are centralization of union power, union democracy, political action, and strategies of collective bargaining. A series of speakers from the union movement will address the class. Midterm, final, and a term paper are required.

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. 497, 3 credits; 498, 6 credits.
Staff.
All requests for permission to register for an internship must be approved by the faculty member who will supervise the project and the chairman of the faculty member's academic department before submission for approval by the Committee on Academic Standards and Scholarship. Upon approval of the internship, the Office of Student Services will register each student for 497, for 3 credits graded A+ to F, for individual research, and for 498, for 6 credits graded S-U, for completion of a professionally appropriate learning experience, which is graded by the faculty sponsor.

499 Directed Studies Fall or spring. 3 credits.
For individual research, conducted under the direction of a member of the faculty, in a special area of labor relations not covered by regular course offerings. Registration is normally limited to seniors who have demonstrated ability to undertake independent work. Eligible students should consult a counselor in the Office of Student Services *at the time of course registration* to arrange for formal submission of their projects for approval by the Academic Standards 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, 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.
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; permission of instructor.
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. 3 or 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, incuding mediation, fact-finding arbitration (both voluntary and compulsory), the use of injunctions, and seizure. The course also examines the application of these techiques 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 Ulman, 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, Lujo 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: I&LR 201 and permission of instructor.
J. Gross.
Labor arbitration in the public and private sectors. Students will write research memoranda, briefs, and arbitral opinions on various substantive and procedural topics. Forty to fifty pages of written work will be expected. There will also be opportunity to participate in simulated arbitration proceedings.

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.
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, and permission of instructor.
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. Tentative theoretical analyses of unionism (neoclassical, institutionalist) are compared. The statistical techniques and empirical results of research on the union effect on economic outcomes (wages, prices, inflation, profits, productibility, earnings inequality) are also evaluated. The effect of technology, corporate structures, and public policy on union bargaining power is outlined, and a number of case studies of collective bargaining in the private sector are reviewed. A term paper is required.

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, L. Stefanski, 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. 329.

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. 330.

International and Comparative Labor Relations

J. Windmuller, chairman; M. G. Clark, G. Fields, W. Galenson

330 Comparative Industrial Relations Systems: 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: Non-Western Countries 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 industrialized non-Western countries including Japan, the Soviet Union, Yugoslavia, India, and several others. Emphasis is on government labor policies, trade unions, and collective bargaining. Also included is a review of international organizations concerned with labor problems.

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 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. 329.

530 Comparative Industrial Relations Systems: 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: Non-Western Countries 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 American Labor and International Affairs Spring. 3 credits. Prerequisite: undergraduates, I&LR 330 or 331; graduate students, I&LR 530 or 531.
J. Windmuller.
Subjects usually covered include organized labor and U.S. foreign policy; the history, structure, and activities of international trade union organizations; the work of the ILO; and the labor issues raised by the growth of multinational corporations.

799 Directed Studies
For description see p. 330.

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 is analyzed to gain a deeper understanding of the effects of various government programs targeted at the labor market. Topics covered include education and training, fringe benefits and the structure of compensation, labor-force participation and its relationship to household production, issues regarding occupational choice, an analysis of migration, labor-market disrimination, 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 Fall. 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 Spring. 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.

495 Honors Program Fall and spring (yearlong course). 3 credits each term.
For description see p. 329.

497–498 Internship Fall or spring. 3 and 6 credits.
For description see p. 329.

499 Directed Studies
For description see p. 329.

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 is analyzed to gain a deeper understanding of the effects of various government programs targeted at the labor market. Topics covered include education and training, fringe benefits and the structure of compensation, labor-force participation and its relationship to household production, issues regarding occupational choice, an analysis of migration, labor-market discrimination, and the effects of unions.

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 1984–85.
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. 330.

799 Directed Studies
For description see p. 330.

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.

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 and permission of instructor.
H. Trice.
Focus is on the relationship between organizational life and psychiatric-criminal behaviors. Covers (1) the nature and etiology of psychiatric disorders such as alcoholism, other drug and substance abuse, and the major neuroses; (2) corporate and white-collar criminal behavior; (3) the role of occupational and organizational risk factors in etiology; (4) various types of organizations that represent societal responses to deviant behavior—mental hospitals, prisons, jails, half-way houses, shelter workshops, and self-help groups such as Alcoholics Anonymous; and puts differential emphasis on programs within work organizations that attempt to deal with deviant behaviors, job-based alcoholism, and employee assistance programs. Field format divides class into small groups for application in local relevant organizations.

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. Limited to 45 students. Prerequisite: one or more courses in sociology and permission of instructor.
H. Trice.
Focuses on (1) the societal characteristics of occupations: division of labor, social stratification, mandate and license, occupational ideologies, stories, and tradition; (2) nature and expression of professionalization of occupations; (3) organizational characteristics of occupations: accommodation to formal organizations, occupational associations, and occupational mix; (4)social psychological characteristics of occupations: tempermental and intellectual role demands, occupational attraction, identity, and commitment, and occupational self-images; (5) relationship between occupational structure and organizational structure. Field format divides class into small groups for application among local occupational groups.

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 Organizational Cultures Fall. 3 credits. Limited to 45 students. Prerequisites: one or more courses in sociology and permission of instructor.
H. Trice.
This course reviews the concept of culture as it has evolved in sociology and anthropology, applying it to formal organizations in workplaces such as corporations and unions. The course first examines the nature of ideologies as sense-making definitions of behavior, concentrating on the cultural forms that carry these cultural messages, rituals, symbols, myths, sagas, legends, and organizational stories. Considerable attention will be given to rites and ceremonials as a cultural form in organizational life that consolidates many of these expressive forms into one. The course will examine types of ceremonial behavior such as rites of passage, rites of enhancement, and rites of degradation, including the role of language-gestures, physical settings, and artifacts in ceremonial behavior. The presence of subcultures and countercultures in organizational behavior will also receive attention, especially the part played by occupational subcultures in formal organizations. Emphasis will be placed on empirical examples from both the organizational behavior literature and the professor's field research.

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 Cuture and Personality in Organizational Behavior Fall. 4 credits. Recommended: some acquaintance with the substance and methods of behavioral or social science.
L. Gruenfeld.
This course examines personality types from both a comparative cultural and psychodynamic point of view. Social behavior, authority relationships, and work motivation are used to illustrate how various theories could be applied to understand behavior and experience in organizations. Communal (expressive), corporate (instrumental), and coercive (power) strategies of adaptation are examined and contrasted.

372 Sociological Models of Organizations Spring. 3 credits. Prerequisites: I&LR 120 and 121 or equivalent.
P. Tolbert.
Introduces students to the basic issues involved in the sociological analysis of organizations. 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.

373 Organizational Behavior Simulations Fall or 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 three simulation games. The first game, *The Organizational Game: Design, Change, and Development,* by Miles and Randolph, simulates traditional organization, while the second, *The Fuzzy Game,* by Paton and Lockett, simulates a cooperative. A third game models executive decision making. Organizational design, decision making, and conflict are the central topics of discussion. The contrasting bases of power in the 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 course work includes observation and analysis of decision making and negotiating behavior in a group.

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 organization such as a school bureaucracy or a social welfare bureaucracy. Students conduct a major study into which they integrate themes from organizational theory. Theoretical issues such as decentralization, participation, and communication are discussed in the seminar.

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.

427 The Professions: Organization and Control Fall. 4 credits.
P. Tolbert.
Focus is on the sources of power and control exercised by professional groups in contemporary society. A number of issues will be examined in this context, including the role of professions in society, processes through which an occupational group becomes defined as a profession, sources of control that professional associations have over their members, relations between professionals and nonprofessionals in organizations, and the relationship between unionization and professionalization of occupations.

475 Organizational and Political Behavior in School Districts Fall. 4 credits. Enrollment limited. Prerequisite: permisson 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. 329.

497–498 Internship Fall or spring. 3 and 6 credits.
For description see p. 329.

499 Directed Studies
For description see p. 329.

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.
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.

620 Theories of Organizational Change, Innovation, and Evaluation Spring. 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; and permission of instructor.
L. Gruenfeld.
This applied course considers theories and techniques for the identification and improvement of organizational problems at the behavioral (micro) level. Methods for the implementing of change are evaluated in the light of several normative and descriptive theories of individual and group development and effectiveness. The course emphasizes both quantitative and qualitative data processing procedures.

622 Organizations and Environments. Spring. 3 credits.
P. Tolbert.
This course will survey the literature on organization-environment relations, including work on organizational dependence and power, management of uncertainty, and other aspects of interorganizational cooperation and conflict. The objective of the course is to provide students with a general theoretical understanding of the way in which organizations can shape their environment and in which the environment constrains and shapes organizations.

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. 4 credits.
L. Gruenfeld.
This course considers psychodynamic approaches to organizational diagnosis at the individual and group level. Topics include leadership, work motivation, stress, and change. Several intervention strategies and consultative approaches are presented by invited social analysts. Students are required to present a paper on a topic suggested by the professor.

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 Gamson, 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 network control agents and target objects. The dynamics of control relationships based on political bargaining, the distribution of power, economic rewards and costs, and historical circumstances are examined in the context of their evolution through organizational adaptation to the environment. Subject matter includes theories of organizational change and application of a control perspective to the institutions of American business, government regulations, athletics, and education.

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 Fall. 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 I&LR 723 and 724 include (1) theoretical, conceptual, and ethical questions; (2) survey research and attitude-scaling procedures; (3) laboratory research methods; (4) participant observation and interview methods; (5) use of documents and qualitative data analysis. Provides students with important philosophical background for doing research and exposes them to a well-balanced, interdisciplinary set of quantitative and qualitative research tools.

724 Behavioral Research Theory, Strategy, and Methods II Spring. Variable credit. Prerequisite permission of instructor. Must be taken in sequence with I&LR 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 and econometic 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: I&LR 520–521 and one year of statistics.
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.

726 Organizational Behavior III Spring. 3 credits. Prerequisite: I&LR 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, 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: I&LR 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 togther 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.

729 Organizational Design and Organizational Change Spring. 3 credits.
S. Bacharach.
Focus is on the application of analytical concepts of organizational science to the practical needs for changing organizations. Emphasis will be on work design, organizational design, incentive systems, and quality of work-life programs as mechanisms for enhancing organizational efficiency. Students will be required to write two papers: one reviewing the literature on a relevant theoretical issue, and the second on a detailed examination of a specific case of organizational change. A number of practitioners will be guest lecturers in this seminar.

798 Internship
For description see p. 330.

799 Directed Studies
For description see p. 330.

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

G. Milkovich, chairman; J. Boudreau, V. Briggs, L. Dyer, F. Foltman, W. Frank, V. Huber, 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 I&LR 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 public efforts to develop the employment potential of the nation's human resources. Changes in the "older" programs in apprenticeship, vocational education, and vocational rehabilitation, as well as the "new" training programs, are studied. Special policy issues pertaining to youth, rural workers, welfare reform, public service employment, worker relocation, economic development, targeted tax credits, and "enterprise zone" proposals will be examined. Comparisons are made with European initiatives.

361 Effective Supervision Fall. 3 credits. Prerequisite: I&LR 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: I&LR 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: I&LR 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 topics of illegal immigration, refugees, asylees, and nonimmigrant workers are also examined. Comparisons are also made with immigration systems of other nations. Public policy aspects are explored in depth.

495 Honors Program Fall and spring (yearlong course). 3 credits each term.
For description see p. 329.

497–498 Internship Fall or spring. 3 and 6 credits.
For description see p. 329.

499 Directed Studies
For description see p. 329.

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 read 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 Internal Staffing: Managing Careers in Organizations Spring. 3 credits. Prerequisite: I&LR 260 or 560 or equivalent, and permission of instructor.
S. Rynes, V. Huber.
Analysis of the movements of people within organizations and the management of career development processes. Selected topics include career planning methods and techniques, career and life stages, mentorships, lifetime employment systems, entrepreneurship, midlife career changes, criteria for internal promotions, and the role of performance evaluation and assessment centers in placement decisions.

660 Performance Evaluation Fall or spring. 3 credits. Prerequisite: I&LR 260 or 560 or equivalent, and permission of instructor.
V. Huber
Devoted to understanding the importance and dilemma of conducting an effective performance evaluation program. Emphasis will be given to (1) objectives of performance appraisal; (2) linkage to job analysis; (3) legal requirements of appraisal processes; (4) factors affecting appraisal accuracy; (5) measurement issues; and (6) the appraisal interview process. Emphasizes theory as well as practice.

661 Applied Personnel and Organizational Development Practice Spring. 3 credits. Prerequisite: undergraduates, I&LR 260; graduate students, I&LR 560 or equivalent.
Staff.
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 Spring. 3 credits. Limited to a total of 40 ILR and hotel administration students. Prerequisite: I&LR 260 or 560 or equivalent, and permission of instructor.
W. Wasmuth.
Techniques of simulation are applied to a hotel banquet operation. Although much of the material relates to service management, simulation as an approach to training managers has wider and growing importance to all types of organizations. Students, working in teams, are provided with realistic problem-solving situations involving issues of employee morale, turnover, absenteeism, productivity, customer satisfaction, internal control, job demands versus skill levels, profit and loss, and changing economic conditions. Team reports and individual assignments are supported by research findings.

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. 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. Enrollment limited. Prerequisite: I&LR 260 or 560 plus two other courses in personnel and human resource studies and permission of instructor.
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.
L. Dyer, F. Foltman.
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 560 or equivalent and one semester of statistics; working knowledge of factor analysis, item analysis, regression analysis, and ANOVA; and permission of instructor.
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. Limited to 30 students. Prerequisite: I&LR 260 or equivalent and permission of instructor.
L. Dyer, G. Milkovich, R. Risley, S. Rynes.

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.

690 Personnel Information Systems Fall. 4 credits. Prerequisite: I&LR 260, 560, or the equivalent; advanced electives in personnel; at least two courses in statistics; and permission of instructor.
L. Dyer.
This course is designed to introduce students to personnel information systems and to provide hands-on experience in using one such system, which is mounted on Cornell's DEC computer. The first few weeks of the course involve an introduction to basic concepts and to the use of the DEC computer. The remaining weeks are taken up with cases and exercises whose solutions involve data accessing, manipulation, and analysis. The purpose is to help provide the computer knowledge and analytical skills necessary to function effectively in modern personnel departments.

691 Human Resource Planning Spring. 4 credits. Prerequisites: I&LR 560 or equivalent, two courses in statistics, and permission of instructor.
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 560 or equivalent and permission of instructor.
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 firms' responsibilities for failure to comply with these legal requirements are considered.

760 Seminar: New Concepts in Pay Determination Fall or spring. 3 credits.
G. Milkovich.
Reviews theories and research on reward and compensation from economics, pyschology, and sociology. The focus will be at the employer-employee level. Each theory or model will be examined to identify content and implications as well as to compare for points of contradiction and/or consistency. Research related to executive compensation, strategic compensation issues, game sharing, and comparable worth will also be examined.

761 Human Resource Economics and Public Policy Spring. 3 credits.
V. Briggs.
A review of contemporary labor-market trends and theories as they relate to public efforts to develop the employment potential of the nation's human resources 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. The role of research to policy formulation and methods of evaluation of social programs will be reviewed. Comparison will also be made with European initiatives.

798 Internship
For description see p. 330.

799 Directed Studies
For description see p. 330.

960 Workshop in Personnel and Human Resource Studies Fall or spring. 2 credits. Enrollment limited to M.S. and Ph.D. candidates. S-U grades only.
Staff.
The workshop is designed to provide a forum for the presentation and critical discussion of current research being undertaken by graduate students, faculty members, and invited guests in the field of personnel and human resource studies. All M.S. and Ph.D. candidates in the Department of Personnel and Human Resource Studies are urged to enroll; candidates in other departments are cordially invited to do so. Each participant will have an opportunity to benefit form the collective wisdom of the others in the formulation, design, and execution of his or her research, as well as to become current on the latest developments in the field.

Interdepartmental Courses

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 bargainng 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: master's degree or admission to Ph.D. candidacy. Not offered 1984–85.
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

Metropolitan

The following courses are open only to participants in the Extension Division in New York City. These courses are not open to undergraduate or graduate students matriculated in the Ithaca ILR programs.

260 Personnel Management Fall or spring 3 credits.
Focuses on management of personnel in organizations. Deals with manpower planning, recruiting, selection, wage and salary administration, training, performance appraisal, organizational development, and the administration of personnel department activities. Special attention is paid to government manpower policy and its implication for personnel management.

301 Labor Union Administration Fall or spring. 3 credits.
A review of the operations of American unions, including a general theoretical framework but with major emphasis on practical operating experience. The course will consider the formal government of unions; organizational or institutional purposes and objectives and how these are achieved; underlying structure and relationship among members, locals, and national organizations; the performance of the primary function of organizing; negotiating; contract administration; and the effect of the Landrum-Griffin Act.

326 Sociology of Occupations Fall or spring 3 credits.
Focuses on (1) the changing character of American occupations within the context of social change; (2) occupational status—differences in income, prestige, and power and the resultant general phenomenon of social stratification; (3) vertical and horizontal occupational mobility; (4) recruitment and socialization into occupational roles; (5) the process of professionalization; and (6) comparison of personnel occupations with the career and organizational patterns of other occupations. A major sociological theme is the relationship between occupational structure and workplace structure.

346 Economics of Collective Bargaining Fall or spring. 3 credits.
Economic aspects of the negotiation, terms, and effects of union-management agreements at the individual firm, industry regional, and national levels. Topics examined include forces influencing contract demands and terms, employer adaptation to higher wages and benefits; interindustry differences in competitiveness, firm size, and markets; regional location of industry, international competition; government regulations; labor supply; inflation, recession, and unemployment.

350 History of Industrial Relations in the United States Fall or spring. 3 credits.
This review of the history of industrial relations in the United States emphasizes developments in the twentieth century. The course concentrates on the American worker, both union and nonunion; labor movements; and the environmental forces that have shaped industrial relations in the United States. Readings are selected from scholarly accounts and original sources.

351 Collective Bargaining Fall or spring. 3 credits.
A comprehensive study of collective bargaining, the negotiation and scope of contracts, the day-to-day administration of contracts, the major substantive issues in bargaining, including their implication for public policy, and the problem of dealing with industrial conflict.

352 Labor Relations Law and Legislation Fall or spring. 3 credits.
A survey of the law governing labor relations. The legal framework in which the collective bargaining relationship is established and 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 speciality, 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.

Upstate

The following courses are open only to participants in the Extension Division's statewide credit programs in labor studies and management studies. These courses are not open to undergraduate or graduate students matriculated in the Ithaca ILR programs.

252 Contract Bargaining Fall or spring. 3 credits.
Examines the principles of contract bargaining, including bargaining environments and structures as well as standards used in bargaining. Students will learn to prepare bargaining demands, cost economic items, draft noneconomic contract language, negotiate economic and noneconomic issues, and resolve a contract bargaining impasse. The course will consider the impact of contract bargaining outcomes on workers, unions, employers, and the public.

253 Contract Administration Fall or spring 3 credits.
Focuses on the role of the steward in administering the union contract in the workplace. Students will evaluate grievance and arbitration contract clauses, the grievance procedure in practice, the role of the union steward, the role of local and international unions, negotiation of grievances, and preparation for arbitration. Students will analyze the impact of grievance and arbitration procedures on workers, unions, and employers.

254 Labor Law Fall or spring. 3 credits.
Examines the principles of labor law by looking at social philosophy and the historical context of federal labor legislation from the 1930s. Students will concentrate on major provisions of the National Labor Relations Act, examining how the National Labor Relations Board and the federal courts have interpreted the national labor laws. Discussion will include new directions in labor legislation and interpretation with consideration given to the impact of labor law on workers, unions, and employers.

255 Labor History Fall or spring. 3 credits.
Reviews American labor history from the prespective of workers' social dimensions of the development of the working class, reform and revolutionary movements, and the emergence of craft, industrial, and public employee unions. Included will be a discussion of the development of trade union institutions and leaders and the evolution of union political activities and collective bargaining. Special attention will be paid to the involvement of women and minority workers with unions.

256 Dispute Resolution Fall or spring. 3 credits.
Examines third-party participation in dispute resolution in private and public sector collective bargaining. Development of dispute resolution methods in American labor relations; issues and practices in neutral, binding arbitration of grievances and mediation; conciliation; and fact-finding procedures will be discussed. We will also look at exclusive labor-management mechanisms to settle industry disputes

257 Personnel Administration Fall or spring. 3 credits.
Designed to provide an overview of personnel practices in the modern organization. It will focus on manpower planning, employment, training and development, motivation and compensation, and performance appraisal and communication for students who are currently supervisors or personnel practitioners or for those aspiring to those positions.

258 Organizational Behavior Fall or spring. 3 credits.
Designed to illustrate how behavioral science theory leads to research and how theory and research provide a basis for practical application in business, industry, education, and government.

259 Union Administration Fall or spring. 3 credits.
Focus is on the principles and practices of effective union administration. Students will study the dynamics of democratic organizations and the development of organizational leadership. The course explores alternative methods of decison making and lines of responsibility. The legal obligations of unions and union officials will be discussed and analyzed. The course also examines the structure and evolution of relationship inside the labor movement.

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
Brooks, George W., M.A., Brown U. Prof., Collective Bargaining, Labor Law, and Labor History
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
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., LL.B., Stanford U. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History
Gray, Lois S., Ph.D., Columbia U. Prof., Extension
Gross, James A., Ph.D., U. of Wisconsin. Prof., Collective Bargaining, Labor Law, and Labor History
Gruenfeld, Leopold W., Ph.D., Purdue U. Prof., Organizational Behavior
Hammer, Tove H., Ph.D., U. of Maryland. Assoc. Prof., Organizational Behavior
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
Jakubson, George H., Ph.D., U. of Wisconsin. Asst. 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
Stefanski, Leonard A., Ph.D., U. of North Carolina. Asst. Prof., Economic and Social Statistics
Stern, Robert N., Ph.D., Vanderbilt U. Assoc. Prof., Organizational Behavior
Tolbert, Pamela S., Ph.D., U. of California. Asst. 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
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 Management, 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 Accounting for Lawyers

602 Administrative Law

604 Admiralty

606 Agency and Partnership

608 Antitrust Law

616 Commercial Law

618 Comparative Law

620 Conflict of Laws

622 Corporations

624 Criminal Procedure

626 Debtor-Creditor Law

628 The Early Development of Anglo-American Common Law

630 Employment Discrimination

632 Energy and Natural Resources Law

634 Enterprise Organization

636 Environmental Law

638 Estate and Gift Taxation

640 Evidence

642 Family Law

644 Federal Courts

646 Federal Income Taxation

648 Intellectual and Industrial Property

650 International Law

652 International Taxation

656 Interviewing and Counseling

658 Labor Law

660 Land-Use Planning

664 Law Practice Dynamics

666 Law, Society, and Morality

668 Lawyer as a Negotiator

674 Legal Process

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

695 Trusts and Estates II

Problem Courses and Seminars

700 Advanced Antitrust Law and Policy

702 African Law Seminar

704 American Legal Theory

708 Children's Rights

710 Contemporary Problems in International Law

712 Copyright, Trademark, and Patent Law

714 Corporate Practice

718 Criminal Appellate Advocacy

720 Equal Protection Seminar

721 Estate Planning

722 European Economic Community Law

724 Evidence Codification and Reform

726 Foreign Investment in Developing Countries

728 Information Law Seminar

730 International Business Transactions

734 International Trade Law

736 Labor Arbitration and Mediation

740 Law and Economics Seminar

744 Law and Medicine

752 Legal Aid I

753 Legal Aid II

756 Legal Predicaments in Settling Lawsuits

764 Organized Crime Control

766 Problems in Criminal Procedure and Postconviction Remedies

768 Problems in Legislation

770 Products Liability Seminar

774 Professional Responsibility Seminar

778 The Religion Clauses of the First Amendment

782 Sociology of Law

Faculty Roster

Aman, Alfred C., Jr., J. D., U. of Chicago. Prof.
Barcelo, John J. III, S.J.D., Harvard U. A. Robert Noll Professor of Law
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. J. Du Pratt White Professor of Law
Hammond, Jane L., J.D., Villanova U. Prof.
Hay, George A., Ph.D., Northwestern U. Prof., Law/Economics
Henderson, James A., Jr., LL.M., Harvard U. Frank M. Ingersoll Professor of Law

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.
Siliciano, John A., J.D., Columbia U. 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.

Graduate School of Management

Administration

Curtis W. Tarr, dean
Thomas R. Dyckman, associate dean for academic affairs
James W. Schmotter, associate dean for administration
Ann L. Calkins, assistant dean for external relations
Albert E. Brill, assistant dean for placement
Harriet A. Peters, assistant director for placement
Anne Sandoe-Thorp, director of student affairs and financial aid
Eugene Ziegler, manager of computer services
Betsy Ann Olive, librarian
Ellen Hayth, registrar
Linda Myers, publications coordinator
Linda Pike, managing editor, *Administrative Science Quarterly*

The Graduate School of Management prepares men and women for managerial careers in business. The school offers course work in many disciplines to provide potential managers with an understanding of the complexities of the professional world in which they will operate and of the organizations of which they will become a part.

A bachelor's degree or its equivalent is required for admission to the two-year program leading to the Master of Business Administration (M.B.A.) degree. Nearly half of the students have a background of undergraduate studies in arts and sciences, and about one-quarter in engineering. 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 *Cornell University Announcement, Graduate School of Management*, obtainable from the Office of Admissions and Student Affairs, Graduate School of Management, 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 the acquisition of enterprises from the viewpoint of individuals who desire to become the principal owners. Reviews include legal and tax aspects, valuation techniques, organization forms, and venture-capital sources, as well as planning techniques necessary to launch a successful venture.

NCC Common Core Courses

NCC 500 Financial Accounting

NCC 501 Quantitative Methods for Management

NCC 502 Microeconomics for Management

NCC 503 (NBP 500) Marketing Management

NCC 504 (NCE 540) Organizational Theory and Behavior

NCC 505 Macroeconomics and International Trade

NCC 506 (NBP 502) Managerial Finance

NCC 507 (NCC 504) Management Information Systems

NCC 508 (NBP 501) Production and Operations Management

NCC 510 (NBP 504) Business Government Interface

[NCC 511 (NBP 503) Business Policy Not offered 1984–85]

NBA Business Administration Elective Courses

Accounting

NBA 500 Intermediate Accounting

NBA 501 Advanced Accounting

NBA 502 Managerial Cost Accounting

NBA 504 Taxation Affecting Business and Personal Decision Making

NBA 505 Auditing

NBA 506 Financial Information and Evaluation

NBA 507 Federal Income Tax

Economics

NBA 520 (NCE 525) Pricing and Strategy

NBA 521 (NCE 526) Regulation, Deregulation, and Antitrust: Government Regulation of Business

NBA 522 (NCE 528) Topics in Managerial Economics

Finance

NBA 540 (NBA 514) Financial Policy Decisions

NBA 541 (NBA 515) Economic Evaluation of Capital Investment Projects

NBA 542 (NBA 516) Security Analysis and Investment Management

NBA 543 (NBA 518) Financial Markets and Institutions

NBA 544 (NBA 519) Seminar in Bank Management

NBA 545 (NBA 521) Finance Theory

NBA 546 (NBA 524) Options, Bonds, and Commodities

NBA 547 (NBA 525) Investment Banking

General Management

NBA 560 (NBA 510) Law of Business Associations

NBA 561 (NBA 511) Advanced Business Law

NBA 562 (NBA 513) Introduction to Estate Planning

NBA 563 Strategic Business Policy Issues

NBA 564 Entrepreneurship and Small Business Management

NBA 566 Ethical Dilemmas in Management

NBA 567 (NCE 581) Management Writing

NBA 568 (NCE 582) Oral Communication

International Management

NBA 580 (NPP 502) Industrial Policy: Lessons for the United States from Japan and Europe

NBA 581 (NCE 504) Challenges to American Democracy

NBA 582 (NCE 505) International Trade and Finance

NBA 583 (NCE 506) The Environment of International Business in the Middle East

NBA 584 (NCE 507) The Multinational Business Firm

NBA 585 (NCE 508) International and Comparative Management

NBA 586 (NCE 509) The Environment of International Business in Southeast and East Asia

NBA 587 (NCE 510) Crisis and Change in the International Political Economy

NBA 588 (NCE 514) Administration of Agricultural and Rural Development

NBA 589 Business in Japan

Management Information Systems

NBA 600 (NCE 570) Data-Base Management

NBA 601 Information Systems for Manufacturing

NBA 602 (NCE 569) Microcomputers in Business

Marketing

NBA 620 (NBA 541) Marketing Research

NBA 621 (NBA 542) Advertising Management

NBA 622 (NBA 543) Marketing Strategy

NBA 623 (NBA 545) Models and Methods for New Products

[NBA 624 (NBA 546) Marketing Decision Analysis Not offered 1984–85.]

[NBA 625 (NBA 548) Marketing Management of Industrial Products Not offered 1984–85]

NBA 626 (NBA 551) Consumer Behavior

NBA 627 (NBA 547) Behavioral Marketing

Operations Management

NBA 640 (NBA 560) Production Management

NBA 641 (NBA 562) Business Logistics Management

NBA 642 (NCE 565) Applied Econometrics

NBA 643 (NCE 566) Management Science

Organizational Behavior

NBA 660 (NCE 543) Organizations, Environments, and Policy

NBA 661 (NCE 546) Strategic Management and Behavioral Science

NBA 662 (NCE 548) Power and Influence

[**NBA 663 (NCE 551) Behavioral Decision Theory** Not offered 1984–85.]

[**NBA 664 Organizational Development and Design**

NBA 665 Survival within the Organization

Public Management

NBA 680 (NPA 500) Management of Urban Issues

NBA 681 (NPA 512) Effective Management Consulting

NBA 682 (NPA 518) Public Affairs Colloquium

NBA 683 (NPP 503) Managing Governmental Systems

NBA 684 (NHP 500) Health Services Organizations and Financing

NBA 685 (NHA 507) Foundations of Social Policy: Implications for Business and Economic Growth

NBA 686 The Politics of Technical Decisions I

NBA 687 The Politics of Technical Decisions II

NMI and NRE Research

NMI 500–502 Directed Readings and Reserch

NRE 502 Advanced Seminar in Current Marketing Research

[**NRE 503 Advanced Capital Market Theory** Not offered 1984–85.]

NRE 504 Advanced Seminar in Accounting

NRE 505 Advanced Workshop in Finance

[**NRE 506 Advanced Seminar in Banking and Financial Markets** Not offered 1984–85]

NRE 507 Advanced Corporate Finance Theory

[**NRE 508 Advanced Seminar in Operations Management** Not offered 1984–85.]

NRE 509 Advanced Seminar in Organizational Behavior

NRE 510 Advanced Workshop in Applied Economics

Faculty Roster

Abolafia, Mitchell, Ph D., SUNY at Stony Brook. Asst. Prof., Organizational Behavior
Ahlers, David M., Ph.D., Carnegie-Mellon U. Don and Margi Berens Associate Professor of Entrepreneurship
Battistella, Roger M., Ph.D., U. of Michigan. Prof., Medical Care Organization
Bent, Fredrick T., Ph.D., U. of Chicago. Assoc. Prof., Public Management
Bierman, Harold, Jr., Ph.D., U. of Michigan. Nicholas H. Noyes Professor of Business Administration, Business Administration/Finance
Bugliari, Joseph B., J.D., Cornell U. Prof., Agricultural and Business Law
Chan, Louis, Ph.D., Rochester U. Asst. Prof., Finance
Conway, Richard W., Ph.D., Cornell U. Prof., Information Systems
Dyckman, Thomas R., Ph.D., U. of Michigan. Ann Whitney Olin Professor of Accounting, Accounting
Elliott, John A., Ph.D., Cornell U. Asst. Prof., Accounting
Flash, Edward S., Jr., Ph.D., Cornell U. Assoc. Prof., Public Management
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 at Irvine. Asst. Prof., Organizational Behavior
Lind, Robert C., Ph.D., Stanford U. Prof., Economics and Public Management
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. Assoc. 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., Information Systems
Rao, Vithala R., Ph.D., U. of Pennsylvania. Prof., Marketing/Quantitative Analysis
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
Swieringa, Robert J., Ph D., U. of Illinois. Prof., Accounting
Thaler, Richard H., Ph.D., U. of Rochester. Assoc. Prof., Economics
Thomas, L. Joseph, Ph D., Yale U. Prof., Production and Quantitative Analysis
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

Lecturers

Pike, Alan, M.A., Cornell U. Lec., Management Communication
Rosen, Charlotte, Ph D., Cornell U. Lec., Management Communication

Adjunct and Visiting Faculty

Goetz, George, M.B.A., Harvard U. Visiting Prof., Entrepreneurship
Golay, Frank, Ph D., U. of Chicago. Prof. Emeritus, Economics and Asian Studies
Katzenstein, Peter J., Ph.D., Harvard U. Prof., Government
Lebow, Richard N., Ph.D., City U. of New York. Prof., Government
Lowi, Theodore J., Ph.D., Yale U. John L. Senior Professor of American Institutions, Government
Nelkin, Dorothy W., B.A., Cornell U. Prof., Sociology
Pempel, T. J., Ph.D., Columbia U. Prof., Government
Sorter, George, Ph.D., U. of Chicago. Visiting Prof., Accounting
Tosi, Henry L., Ph.D., Ohio State U. Visiting Prof., Organizational Behavior
Tsai, Yehoshua, Ph.D., Brandeis U. Visiting Prof., Marketing

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, L. C. Clark, 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, J. Mason, D. Miller, N. Mondy, C. Olson, R. Parker, N. Peckenpaugh, 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. Watford, 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 room, 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 specialities 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 should check with the instructor); spring, a one-semester college biology course. 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 lecs. Evening prelims: times 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 and wellness. Discussion of current issues, such as weight control, vegetarianism, diet, and cancer.

146 Introductory Foods Fall or 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: times 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 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.

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 330 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 or 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. Not offered 1984-85; next offered 1985-86.
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. Offered alternate years.
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 2:30-4. 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 Spring or summer. 2-6 credits. S-U grades optional. Prerequisites: junior, senior, or graduate standing; 9 hours of course work in DNS; 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 8. V. Utermohlen.
Study of the physiologic and metabolic anomalies in chronic and acute illnesses and the principles of nutritional therapy and prevention. The topics covered 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: times to be arranged.
Instructor to be announced.
Development of skills in formulation and analysis of therapeutic dietary regimes. 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, M F 11:15; 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 Spring. 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 Spring. 1 credit. Limited to 16 students. Prerequisite: NS 446 or concurrent registration. S-U grades optional.
M 1:25-4:25. G. Armbruster.
Laboratory experiments designed to illustrate the effect of varying ingredients and treatment on the quality of food products. Objective testing methods are used to determine food-quality characteristics.

448 Physiochemical Aspects of Food—Laboratory Spring. 1 credit. Limited to 16 students. Prerequisite: NS 446 or concurrent registration. S-U grades optional.
W 1:25-4:25. G. Armbruster.
Laboratory experiments designed to illustrate (a) the physiochemical behavior of colloidal systems, (b) chemical reactions of some food components, and (c) effects of temperature, pH, moisture, inorganic salts, and enzymes on physiochemical changes in natural foods, food components, and food mixtures.

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 or spring. 3 credits. Limited to 30 students. Prerequisites: NS 378, Microbiology 290 and 291, a course in learning theory, 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. Estimated cost, $5. Uniform required.
Lec, T 8-9:55; lab, 1 sec, M T W R or F 1:30-6; 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. 3 credits. Offered alternate years. Not offered 1984-85; next offered 1985-86.
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 physiochemical 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. Not offered 1984-85; next offered 1985-86.
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 on 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. 3 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; disc, T 2:15-3:05. J. Haas.
A laboratory course to train students in methods and techniques used to assess the physical growth and development of 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 instructor. S-U grades optional. Offered alternate years. Not offered 1984-85; next offered 1985-86.
T R 1:30-3. D. Levitsky.
This course is a multidisciplinary discussion of the causes, effects, and treatments of human obesity. Topics include the biopsychology of eating behavior, genetics of obesity, role of activity and energy metabolism, psychosocial determinants of obesity, anorexia nervosa, therapy and its effectiveness, and social discrimination.]

614 Topics in Maternal and Child Nutrition Fall. 3 credits. Prerequisites: NS 331, and 222 or 347, Biological Sciences 311, and permission of instructor.
T R 9:05-10:30. K. Rasmussen.
Advanced course on the role of nutrition during pregnancy and lactation. Feeding and growth of infants and children in health and disease is considered. Critical evaluation of current literature is emphasized.

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 Fall or spring, first half of semester. 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 instructor. S-U grades only.
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.

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.

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 Weeks 1-3. 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, and 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. Not offered 1984-85; next offered 1985-86.
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.
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. Not offered 1984-85; next offered 1985-86.
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. 2-3 credits. Limited to graduate students. Prerequisites: Statistics and Biometry 602 or 604 or equivalent and NS 331 or equivalent.
Hours to be arranged. J-P. Habicht.
Teaches the principles underlying the evaluation of nutrition intervention programs and of nutritional assessment. Reviews the levels of evidence about nutrition and health for making decisions, indicators of nutritional status in individuals, indicators of nutritional status in populations, and design of nutritional evaluations. Teaches principles of using nutritional information for decision making.

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.
Lec, M F 11:15; sem, hours to be arranged. 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 Physiochemical 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 physiochemical 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. 2 credits. Limited to students in the Clinical Nutrition Program. Prerequisites: NS 441 and 442 and permission of instructor. S-U grades only.
2 hours per week, 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.
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, 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 in improving 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 years.
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.
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. Prerequisite: a course in psychology and NS 361 and permission of instructor. S-U grades optional. Offered alternate years.
T R 1:30–3. 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
Clark, Larry C., Asst. Prof., New York State College of Veterinary Medicine/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

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 Michael J. Amidei, Quartermaster, United States Army
Captain Leo P. Hirrel, Quartermaster, United States Army Reserve
Captain Rodney O. Luce, Field Artillery, United States Army
Captain Vincent J. Scully, Infantry, 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, and 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 correctible 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 the Advanced Phase (Mil S III and IV) during the next two years. A total of twelve credits of military subjects is required. In addition, a number of non–officer-education academic-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 four 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, drill and ceremony, physical training, and winter survival. These modules are designed to promote personal development and enrichment. While these activities do not receive academic credit, students 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 and sophomore 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. Scholarship cadets and advanced course 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 (DMGs). 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. Non–scholarship 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 non–scholarship, non–Regular Army officers will be approved for outstanding students. 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 the 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.

Non–scholarship cadets accepting a Regular Army commission serve a minimum of three years on active duty followed by three years in reserve status.

Scholarship cadets, whether commissioned in the Regular Army or the Reserve, generally serve four years on active duty and two years in reserve status; however, some may serve eight years on reserve duty.

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. Requests will be considered on the basis of needs of the service. Admission to graduate school is the student's responsibility.

Benefits

Each cadet in the Advanced 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 $600 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 I cadets select either rappelling-drill and physical training, or ranger training. In the spring, class choices are winter survival–land navigation or ranger training. 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 Commander 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 90 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 the Two-Year Program Scholarship.

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.

Summer Training

Each summer, students in the Scholarship Program spend approximately four to six weeks on a Navy ship, the unit sail-training vessel *Alliance,* 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 $500 a month.

Active Duty Requirements

As required by Section 2107, Title 10, United States Code, selected applicants must enlist in the United States Naval Reserve for six years in pay grade E-1 (seamen recruit) before 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 sixty-foot seagoing sail-training yawl 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.
One-hour class each week (lecture-recitation). Navy staff.
A study of fundamental aspects of naval science, including its conceptional contributions to sea power, factors involved in the physical development of naval forces, resources which must be managed, and prospects for the future.

Nav S 102 Naval Ship Systems (also Mechanical and Aerospace Engineering 101) Spring. 3 credits
Three lecture-recitation classes each week. R. L. Wehe, Navy staff.
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.

Nav S 157 Principles of Sailing Fall and spring. Physical education credit.
One class each week. Navy staff.
Instruction in basic sailing skills and safety principles. Students sail small and large boats on Cayuga Lake, weather permitting. Focus is U.S. Navy Class B inshore skipper certification.

Sophomore Year

Nav S 201 Naval Weapons Systems Fall. 3 credits. Prerequisites: Mathematics 192 or 112 and Physics 207 or 213.
Lecture-recitations, M W F 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 specific U.S. Naval weapons.

Nav S 202 Seapower—History of the Navy Spring. 2 credits.
Two seminars 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. The last section of the course concentrates on the balance between the superpower navies today.

Junior Year (Navy)

Nav S 321 Naval Operations Fall. No credit.
One one-hour class 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 Principles of Navigation (also Agricultural Engineering 305) Spring. 4 credits.
Four classes each week (lecture-recitation-project work).
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 Organizational Behavior and Small Group Processes (also Hotel Administration 414) 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 experiential 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.
Three lectures-recitations 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, predental 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 adminsitration
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 select technical courses for 50 percent of all electives not required by the University academic program or by the NROTC program courses.

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 Science
Engr 105 Introduction to Computer Programming
CS 101 The Computer Age
CS 102 Introduction to FORTRAN programming
CS 211 Computers and Programming
CS 314 Introduction to Computer Systems and Organization
M&AE 389 Computer-aided Design
CS 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 *Alliance* 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 *Alliance*, 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 seven of the last eight 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, and academic field of study and the needs of the Air Force.

Requirements for Enrollment

The Air Force Officer Education Program is open to any undergraduate or graduate student enrolled in any major field of study. The student's academic course of study is often a prime factor in determining the kind of career pursued in the Air Force. (See Air Force Careers, below.)

Applicants must be United States citizens. Noncitizens may enroll and will receive certificates acknowledging completion of the course but cannot receive a commission.

Applicants who are interested in flying (as pilot or navigator) or missile duty should make that request known at the time they enter the program.

All applicants receive physical examinations at no cost and, to be accepted, must meet 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 correctible 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 General Military Course (GMC) and the Professional Officer Course (POC). The GMC carries *no* military commitment, and students may withdraw at any time during that period.

General Military Course

Students in the GMC take one credit of classroom work offered by the Department of Aerospace Studies each semester. During the freshman year the student examines the organization and mission of the United States Air Force and the role United States military forces in the contemporary world. In the sophomore year the student studies the history and development of military aviation and American air power. In both years we emphasize officership, professionalism, and human rights within the United States Air Force.

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 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 to themselves.

This program consists of ground school and thirteen and one-half 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, at his or her own expense, 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 October through April 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. Scholarships of three and one-half, three, two and one-half, and two years 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 for scholarship consideration. 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 scholarships for two, two and one-half, three, three and one-half, and four years are limited to students majoring in engineering, physics, mathematics, computer science, and meteorology. A limited number of four-year scholarships are available to those enrolled in nontechnical academic majors such as business administration, accounting, and management. 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 allowances authorized by current directives, plus an allowance for travel to and from the field site. Most textbooks and supplies required for Department of Aerospace Studies courses are provided.

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 AFROTC 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.
One class each week. J. M. Kubiak.
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.
One class each week plus a field trip to a local military installation. J. M. Kubiak.
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.
One 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.
One 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.
Two or three 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 leadership 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.
Two or three classes each week. M. R. McFarren.
Management at the junior officer level. Basic concepts of management and the 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 Armed Conflict and Society Fall. 3 credits.
Three classes each week. Presentations by military 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.

Air S 462 National Security Forces in Contemporary American Society I Fall 3 credits.
Two or three 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, is studied.

Elective Course

Air S 405 Principles of Air Navigation and Aircraft Systems Term to be announced. 3 credits.
Two classes each week.
Provides a basic understanding of aircraft systems, aerodynamics, flight instruments, air navigation (including radio navigation), meteorology, weather services, national airspace system, federal aviation regulations, medical factors affecting flight, flight preparation, airport operations, and emergency procedures.

Leadership Laboratory Courses

All Air Force cadets spend at least one and one-half hours a week throughout the academic year in a leadership laboratory, for which no academic credit is given. Occasionally laboratories are held at times other than the normally scheduled period (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

Laing E. Kennedy, 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 athletics 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.

Registration Procedure

After picking up their general registration materials in Barton Hall, students enter the west end of Teagle Hall (across Garden Avenue from Barton Hall). Signs in the hall give directions to the gym, which is upstairs. In the gym students:

1. sign up for a swim test (men sign at the Teagle table; women at the Helen Newman table; nonswimmers do not sign up for a swim test—they go directly to the card files);
2. after obtaining an appointment for a swim test, go to the card file in the center of the gym and receive their permanent yellow record card;
3. hand carry the permanent card to the course table of their choice (when signing up for a course, students should make sure they understand when and where the class will meet, and any fee policy connected with the course);
4. leave the yellow card on the sign-up table after the coach has filled it out.

During spring-term registration, students follow steps two through four above. Students who need to take the swim test during the spring term must arrange an appointment through the physical education office in Teagle Hall.

Note: Members of intercollegiate teams who need physical education credit must appear at each physical education course registration in Teagle gym to report that they are meeting their requirement through team participation. If for any reason they are dropped from the team roster, they must go immediately to the physical education office in Teagle Hall and enroll in a course.

Persons registering as noncredit students go directly to the coaches' tables and fill out their course materials. They do not go to the card file if they are not involved with the two-semester requirement.

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 three 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. One absence and one make-up are permitted students enrolled for credit in the Greek Peak ski program. This means that five attendances are required for credit.

Elective Enrollment

Elective (no-credit) enrollment is allowed, and encouraged. A maximum of five absences is allowed per twenty-four class sessions (a proportional adjustment is made for courses meeting less often). Penalty for noncompliance is a $10 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 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, 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 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, basketball, 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 athletics 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," above).

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.
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.

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 are 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.

Dive Master Fall and spring. Fee charged.
Hours to be arranged. Teagle Hall.
Advanced-level scuba course open only to those who have completed the advanced open-water scuba course.

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.

Aquatic 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.

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.
Develop 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.

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 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-craft 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 canoe 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.

Intermediate Riflery Fall and spring. Fee charged.
Hours to be arranged, Helen Newman Hall.
Advanced course for those who have had experience in target shooting.

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.

Skiing

Skiing Conditioning Fall.
Two classes a week, Helen Newman Hall.
Exercises designed to increase flexibility, strength, and endurance in preparation for the ski season.

Downhill Skiing Spring. Fee charged.
One class a week, Teagle Hall.
Transportation, instruction, ski-lift fees, and skiing 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 Skiing 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.
Two classes a week, Teagle Hall.
Introduction to T'ai Chi, a system of graceful, slow-movement exercises that aim at nurturing relaxation, deep breathing, and improved circulation.

Martial Conditioning and Fitness Fall and spring.
Three classes a week, Teagle Hall.
Exploration of conditioning and fitness procedures used in the major martial arts, such as karate or judo.

Self-Defense for Women Fall and spring. Fee charged.
Hours to be arranged, Teagle Hall.
Basic methods of physical protection for women.

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.

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 Spring. Fee charged.
Two classes a week, Teagle Hall.
Designed for those who have completed Yoga I or its 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
Jane E. Davenport, director, Cornell University Conference Services
Judith K. Eger, director, programs in professional education
Ralph Janis, director, Cornell's Adult Education University
Valerie A. Sellers, registrar
Marjorie S. VanNess, business manager
Kathleen M. Walls, assistant to the dean

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 juniors, 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 of 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, students 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 staff 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.

Programs in Professional Education

Because of Cornell's leadership both in theoretical and applied research, the University offers unique opportunities for professional growth and refreshment to persons in science, technology, government, business, and industry. The division's Programs in Professional Education present intensive updates on specific issues, ideas, and technological advances, involving faculty members whose teaching and research at Cornell center around current and anticipated developments in areas of importance to the corporate sector and the professions. Programs in Professional Education can also respond to the needs and interests of corporate groups or professional societies, developing programs both on and off campus that are suited to their particular educational purposes. For more information, interested persons should telephone 256-4987.

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 1985. 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 1985 *Announcement of Summer Session* will be published in March.

Africana Studies and Research Center

204 History and Politics of Racism and Segregation

470 Nineteenth-Century Resistance Movements

Agricultural and Life Sciences (Interdepartmental)

5 Basic Review Mathematics

Archaeology

100 Introduction to Archaeology

Architecture

125 Introduction to Architecture

Consult the Department of Architecture office for a complete list of summer design offerings.

Art

121 Introductory Painting

123 Landscape Painting

131 Introductory Intaglio Printing

141 Introductory Sculpture

158 Conceptual Drawing

159 Life and Still-Life Drawing

161 Introductory Photo I

168 Black and White Photography

169 Color Photography

369 Advanced Photography Workshop

379 Independent Studio

Asian Studies

320 Seminar on the Sutras

Astronomy

105 An Introduction to the Universe

106 Essential Ideas in Relativity and Cosmology

Biological Sciences

100 General Biology

205 Biomedical Ethics

240 Plant Physiology

245 Plant Biology

278 Comparative Anatomy

331 Principles of Biochemistry, Lectures

360 General Ecology

389 Embryology

421 Comparative Vertebrate Ethology

432 Survey of Cell Biology

475 Ornithology

Chemical Engineering

220 Mass and Energy Balances

646 Controlled Cultivation of Microbial Cells

Chemistry

103–104 Introduction to Chemistry

207–208 General Chemistry

251–252 Introduction to Experimental Organic Chemistry

253–255 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

200 Theories of Human Communication

215 Introduction to Mass Media

301 Oral Communication

312 Advertising and Promotion

360 Scientific Writing for Public Information

363 Organizational Writing

375 Principles of Public Communication

403 Special Topics

460 Video Communication I

461 Advanced Video Communication

Comparative Literature

103 Inner Worlds, Outer Worlds, Other Worlds

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 Microeconomics

102 Introductory Macroeconomics

105 Principles of Accounting

205 Managerial Accounting for Planning and Control

301 Theory of Market Failure

311 Intermediate Microeconomic Theory

312 Intermediate Macroeconomic Theory

313 Intermediate Microeconomic Theory (calculus section)

314 Intermediate Macroeconomic Theory (calculus section)

315 History of Economic Thought

319 Introduction to Statistics and Probability

331 Money and Credit

333 Theory and Practice of Asset Markets

335 Public Finance: Resource Allocation and Fiscal Policy

361 International Trade Theory and Policy

362 International Monetary Theory and Policy

383 Marxist Political Economy

Education

420 Field Experience

497 Informal Study

547 Improvement of College Teaching

620 Internship in Education

800 Master's-Level Thesis

900 Doctoral-Level Thesis

Electrical Engineering

476 Microprocessor Systems

English

108 Writing about Film

109 Introduction to Rhetoric

131 Critical Reading and Writing

135 Writing from Experience

137 Writing Workshop

150 Poems and Stories

151 The Modern Imagination

157 Classic American Authors

158 Modern American Authors

160 Afro-American Literature

227 Shakespeare

270 The Reading of Fiction

271 The Reading of Poetry

275 The American Literary Tradition

280 Creative Writing Workshop

288 Expository Writing

289 The Art of the Essay

311 Fantasy and Horror

319 Chaucer

327 Shakespeare

351 Modern Poetry

360 The American Literary Experiment

367 The American Novel: Tradition and Revolt

380 Creative Writing Workshop

382 Narrative Writing

384 Verse Writing

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 in Wyoming

Government

100 Politics and Moral Choice

111 The Government of the United States

131 Introduction to Comparative Government and Politics

161 Introduction to Political Theory

181 Introduction to International Relations

310 Power and Society in America

316 The American Presidency

339 Society and Politics of Israel

350 Comparative Revolutions

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

203 The American Dream

299 Introduction to the History of China

363 Russian History since 1800

377 From Pericles to Plato: Democracy and Ideal State in Classical Greece

History of Art

202 Survey of European Art: Renaissance to Modern

261 Introduction to Art History: Modern Art

Hotel Administration

161 Keyboarding-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

203 Groups and Organizations

315 Human Sexuality: A Biosocial Perspective

400 Mental Health Problems, Policies, and Programs

402 Supervised Study in Jamaica

507 Professional Improvement

529 Research Design and Analysis

600 Social Planning and Policy Development

Human Ecology (Interdepartmental)

200 Preparation for Field Study: Perspectives in Human Ecology

500 The Professional in Computing

Industrial and Labor Relations

Collective Bargaining

200/500 Collective Bargaining

201/501 Labor Relations Law and Legislation

687 Current Issues in Collective Bargaining

Economic and Social Statistics

510 Introductory Statistics for the Social Sciences

Organizational Behavior

120 Introduction to Macro Organizational Behavior and Analysis

222 Studies in Organizational Behavior: Regulating the Corporation

326 Sociology of Occupations

371 Individual Differences and Organizational Behavior

520 Organizational Behavior I

Personnel and Human Resource Management

260/560 Personnel Management

361 Effective Supervision

Law

497 Family Law

Management

590 Management Communication

Marine Science

Consult the Shoals Marine Laboratory office for a complete list of summer offerings in marine science.

Mathematics

101 History of Mathematics

107 Finite Mathematics

109 Precalculus Mathematics

111–112 Calculus

121–122 Calculus

123 Analytic Geometry and Calculus

192 Calculus for Engineers

200 Foundations of Mathematics

213 Calculus

221 Linear Algebra and Calculus

231 Linear Algebra

294 Engineering Mathematics

333 Introduction to Elementary Number Theory

336 Applicable Algebra

372 Elementary Statistics

421–422 Applicable Mathematics

451 Classical Geometries

Mechanical and Aerospace Engineering

302 Technology, Society, and the Human Condition

Medieval Studies

102 King Arthur and His Knights

Microbiology

290–291 General Microbiology

Modern Languages and Linguistics

Chinese

160 Introductory Intensive Chinese (Mandarin)

201–202 Intermediate Chinese

341–342 Advanced Business Chinese

Dutch

131–132 Dutch Elementary Reading Course

English

101–102 English as a Second Language

215 English for Later Bilinguals

French

101–102 French Basic Course

123 Continuing French

203 Intermediate Composition and Conversation

German

121–122 Elementary German

123 Continuing German

631–632 German Elementary Reading Course

Japanese

160 Introductory Intensive Japanese

341–342 Japanese for Business Purposes

403 Teaching of Japanese as a Foreign Language

Linguistics

101 Introduction to the Scientific Study of Language

Quechua

131–132 Elementary Quechua

Russian

203 Intermediate Composition and Conversation

Spanish

101–102 Spanish Basic Course

123 Continuing Spanish

203 Intermediate Composition and Conversation

Music

105 Introduction to Music Theory

221 Popular Music

331 Summer Session Choir

Natural Resources

201 Environmental Conservation

209 Society, Science, and Environmental Issues

216 Issues in Water Quality

450 Current Topics in Energy and Food Resources

Near Eastern Studies

241 The Holocaust: European Jewry, 1933–45

261 Ancient Seafaring

364 Introduction to Field Archaeology in Israel

Nutritional Sciences

415 Field-based Learning in Nutrition

578 Food Service Management Workshop

Operations Research and Industrial Engineering

260 Introductory Engineering Probability

270 Basic Engineering Probability and Statistics

622 Operations Research I

Philosophy

101 Introduction to Philosophy

103 Reasoning and Writing

131 Logic: Evidence and Argument

145 Contemporary Moral Issues

231 Formal Logic

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 Informal Advanced Laboratory

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

195 Art and Psychology

209 Developmental Psychology

214 Introduction to Cognitive Psychology

215 Language and Communication

277 Psychology of Sex Roles

281 Interpersonal Relations and Small Group Processes

282 Psychology of Stereotyping and Prejudice

286 Nonverbal Behavior and Communication

325 Introductory Psychopathology

350 Statistics and Research Design

469 Psychotherapy Workshop: Its Nature and Influence

Romance Studies

French

201 Introduction to French Literature

222 French Civilization

333 Contemporary French Thought: From Existentialism to Poststructuralism

Rural Sociology

437 Environment and Aging

463 Industrialization as an Instrument for the Development of Rural Areas

Sociology

101 Introduction to Sociology

221 Sociology of Organizations

243 Family

252 Public Opinion

277 Psychology of Sex Roles

281 Interpersonal Relations and Small Group Processes

286 Nonverbal Behavior and Communications

347 Environment and Aging

368 Women and Achievement

Theatre Arts

125 Writing for the Theatre

200 Introduction to Dance I

240 Introduction to the Theatre

287 Summer Acting Workshop

327 Modern Drama

336 American Drama and Theatre

374 Introduction to Film Analysis: Meaning and Value

377 Fundamentals of 16-mm Filmmaking

474 Intensive 16-mm Film Production

475 Seminar in the Cinema I: Vision of the Good in the American Cinema

Theoretical and Applied Mechanics

202 Mechanics of Solids

Veterinary Medicine

638 The Microscope and Its Use

Women's Studies

277 Psychology of Sex Roles

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
Robert W. Kirk, 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. 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 clincal 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.

Note: 500- and 600-level courses are open only to veterinary students except by written permission from the instructor.

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.

671 Diseases of Aquatic Animals Spring.

672 Aquavet: Introduction to Aquatic Veterinary Medicine Mid-May–mid-June.

770 Advanced Work in Avian Diseases Fall and spring.

773 Advanced Work in Avian Immunology 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 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 Medicine Service Fall and spring.

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.

675 Special Problems in Large Animal Medicine Fall and spring.

676 Special Problems in Large Animal Surgery Fall and spring.

677 Special Problems in Large Animal Obstetrics Fall and spring.

678 Fundamental Techniques in Embryo Transfer Spring.

680 Poisonous Plants Fall.

681 Horse Health Management Spring.

682 Large Animal Internal Medicine Fall.

684 Horse Lameness Spring.

686 Goats: Management and Diseases Spring

687 Diseases of Swine Spring.

688 Special Problems in Small Animal Medicine Fall and spring.

689 Special Problems in Small Animal Surgery Fall and spring.

690 Veterinary Dermatology Spring.

691 Advanced Large Animal Internal Medicine Problems Spring.

778 Gastroenterology Conference Spring.

779 Veterinary Gastroenterology 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.

607 Virus Diseases of Cattle Fall.

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.

713 Advanced Immunology: The MHC (Major Histocompatibility Complex) and Its Role in the Regulation of Immune Responses Spring.

714 Advanced Immunology: Viral and Tumor Immunity Spring.

715 Advanced 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 Course in Laboratory Animal Medicine and Science Fall and spring.

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.

791 Mechanisms of Disease Spring.

793 Lectures in General Pathology Fall.

794 Lectures in Special Pathology Spring.

795 Pathology of Laboratory Animals Fall

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.

721 Research Fall and spring.

724 Physiological Disposition of Drugs and Poisons Fall.

729 Receptor Binding: Theory and Techniques (also Biological Sciences 720) Fall.

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.

Cellular Physiology (Biological Sciences 316) Spring.

346 Introductory Animal Physiology, Lectures (also Biological Sciences 311) Fall.

348 Introductory Animal Physiology, Laboratory (also Biological Sciences 319) Fall.

Biological Rhythms with a Period of One Day to One Year (Biological Sciences 351) Fall.

Seminar in Anatomy and Physiology (Biological Sciences 410) Fall and spring.

Fundamentals of Endocrinology Lecture (Animal Science 427) Fall.

Fundamentals of Endocrinology Laboratory (Animal Science 428) Fall.

Comparative Physiology of Reproduction of Vertebrates Lecture (Animal Science 452) Spring.

Comparative Physiology of Reproduction of Vertebrates Laboratory (Animal Science 454) Spring.

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.

628 Graduate Research in Animal Physiology (also Biological Sciences 719) Fall and spring.

652 Applied Electrophysiology (also Biological Sciences 617) Fall

Nutritional Pathophysiology (Biological Sciences 711) Fall.

Endocrine Regulation of Immune Development and Function (Biological Sciences 712) Spring.

Epithelial Transport of Salt and Water (Biological Sciences 713) Fall.

Physiology of Pregnancy (Biological Sciences 714) Spring.

Calcium and Cell Function (Biological Sciences 715) Fall.

Seminar in Insect Physiology (Biological Sciences 716 and Entomology 685) Spring.

Structure and Function of Joints with Emphasis on Arthritis (Biological Sciences 717) Fall.

Gamete Physiology and Fertilization (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.

759 Nutrition and Physiology of Mineral Elements (also Biological Sciences 615 and Nutritional Sciences 659) Fall.

Preventive Medicine

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.

737 Advanced Work in Animal Parasitology Fall and spring.

765 Structure and Function of Protozoan Parasites Spring.

766 Graduate Research Fall and spring.

767 Immunoparasitology Spring.

768 Master's-Level Thesis Research Fall and spring.

769 Doctoral-Level Thesis Research Fall and spring.

783 Wildlife Parasitology Spring

786 Graduate Seminar Fall and spring.

787 The Biology of Parasitism (also Biological Sciences 459) Spring.

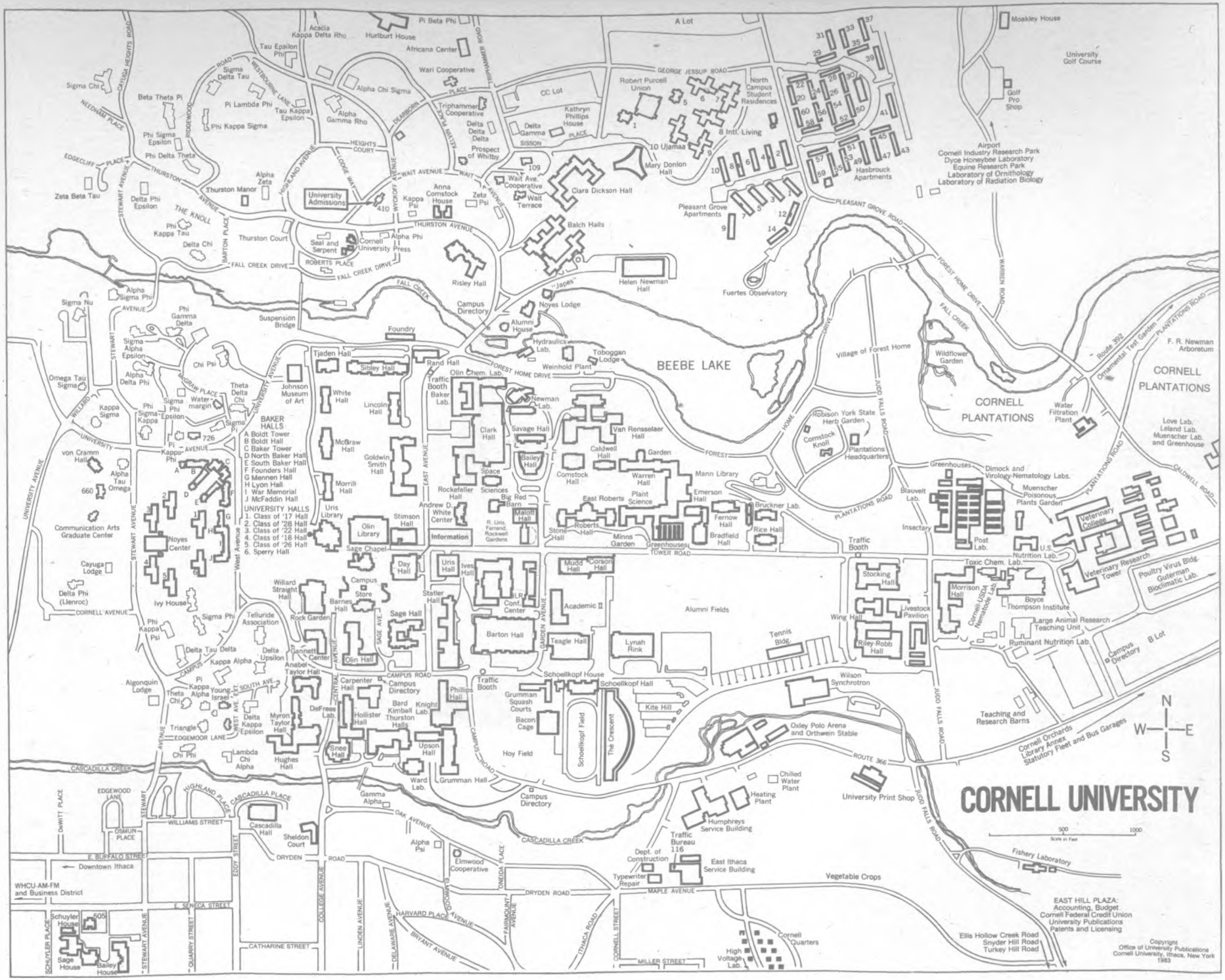
799 Independent Studies in Epidemiology Fall and spring.

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/(Section of 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
Dill, Stephen G., D.V.M., U. of Georgia. Asst. Prof., Clinical Sciences
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
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. Assoc. Prof., Clinical Sciences
Hall, Charles E., D.V.M., Cornell U. Assoc. Prof., Clinical Sciences
Hansel, William, Ph.D., Cornell U. Prof., Physiology/(Section of Physiology)/Animal Science
Harvey, H. Jay, D.V.M., Kansas State U. Asst. Prof., Clinical Sciences
Henion, John D., Ph.D., SUNY at Albany. Assoc. Prof., Diagnostic Laboratory
Hornbuckle, William E., D.V.M., Oklahoma State U. Asst. Prof., Clinical Sciences
Houpt, Katherine A., Ph.D., U. of Pennsylvania. Assoc. Prof., Physiology/(Section of Physiology)
Houpt, T. Richard, Ph.D., U. of Tennessee. Prof., Physiology/(Section of Physiology)
Jacobson, Richard H., Ph.D., Montana State U. Asst. Prof., Diagnostic Laboratory/Pathology
Kallfelz, Francis A., Ph.D., Cornell U. Professor, Clinical Sciences/Physiology/(Section of Physiology)
Kern, Thomas J., D.V.M., U. of Missouri. Asst. Prof., Clinical Sciences
King, John M., Ph.D., Cornell U. Prof., Pathology
Kirk, Robert W., D.V.M., Cornell U. Prof., Clinical Sciences
Krook, Lennart P., Ph.D., Royal Veterinary Coll. at Stockholm (Sweden). Prof., Pathology
Lee, Kyu M., Ph.D., Cornell U. Prof., Microbiology
Leibovitz, Louis, V.M.D., U. of Pennsylvania. Prof., Avian and Aquatic Animal Medicine
Lein, Donald H., Ph.D., U. of Connecticut. Assoc. Prof., Diagnostic Laboratory
Lengemann, Frederick W., Ph.D., U. of Wisconsin. Prof., Physiology/(Section of Physiology)
Lewis, Robert M., D.V.M., Washington State U. Prof., Pathology
Lindmark, Donald G., Ph.D., U. of Rhode Island. Assoc. Prof., Preventive Medicine
Lowe, John E., D.V.M., Cornell U. Assoc. Prof., Clinical Sciences
Lust, George, Ph.D., Cornell U. Prof., Microbiology
McGregor, Douglas D., D.Phil., U. of Oxford (England). Prof., Microbiology
Maylin, George A., Ph.D., Cornell U. Assoc. Prof., Diagnostic Laboratory
Melby, Edward C., Jr., D.V.M., Cornell U. Prof., Clinical Sciences
Minor, Ronald R., Ph.D., U. of Pennsylvania. Assoc. Prof., Pathology
Nathanielsz, Peter W., M.D., U. of Cambridge (England). Prof., Clinical Sciences/Physiology/(Section of Physiology)
Noden, Drew M., Ph.D., Washington U. Assoc. Prof., Anatomy
Norcross, Neil L., Ph.D., U. of Massachusetts. Prof., Clinical Sciences/Microbiology
Noronha, Fernando M., D.V.M., U. of Lisbon (Portugal). Prof., Pathology/Microbiology
Oswald, Robert E., Ph.D., Vanderbilt U. Asst. Prof., Pharmacology
Peckham, Malcolm C., D.V.M., Cornell U. Prof., Avian and Aquatic Animal Medicine
Pollock, Roy V., Ph.D., Cornell U. Asst. Prof., Microbiology
Poppensiek, George C., V.M.D., U. of Pennsylvania. James Law Professor of Comparative Medicine, Microbiology
Postle, Donald S., D.V.M., Ohio State U. Assoc. Prof., Clinical Sciences
Quimby, Fred W., Ph.D., U. of Pennsylvania. Assoc. Prof., Laboratory Animal Sciences/Pathology
Randolph, John F., D.V.M., Cornell U. Asst. Prof., Clinical Sciences
Rebhun, William C., D.V.M., Cornell U. Assoc. Prof., Clinical Sciences
Reimers, Thomas J., Ph.D., U. of Illinois. Asst. Prof., Diagnostic Laboratory
Rendano, Victor T., V.M.D., U. of Pennsylvania. Assoc. Prof., Clinical Sciences
Rickard, Charles G., Ph.D., U. of Michigan. Prof., Pathology
Riis, Ronald C., D.V.M., U. of Minnesota. Assoc. Prof., Clinical Sciences
Sack, Wolfgang O., Ph.D., U. of Edinburgh (Scotland). Prof., Anatomy
Scarlett Kranz, Janet M., Ph.D., U. of Minnesota. Asst. Prof., Preventive Medicine
Schat, Karel A., Ph.D., Cornell U. Assoc. Prof., Avian and Aquatic Animal Medicine
Schlafer, Donald H., Ph.D., U. of Georgia. Asst. Prof., Pathology
Schryver, Herbert F., Ph.D., U. of Pennsylvania. Assoc. Prof., Clinical Sciences/Pathology
Schwark, Wayne S., Ph.D., U. of Ottawa (Canada). Assoc. Prof., Pharmacology
Scott, Danny W., D.V.M., U. of California at Davis. Assoc. Prof., Clinical Sciences
Scott, Frederic W., Ph D., Cornell U. Prof., Microbiology
Sellers, Alvin F., Ph.D., U. of Minnesota. Prof., Physiology
Sharp, Geoffrey W. G., D.Sc., U. of London (England). Prof., Pharmacology
Sheffy, Ben E., Ph.D., U. of Wisconsin. Prof., Microbiology
Short, Charles E., D.V.M., Auburn U. Prof., Clinical Sciences
Slauson, David O., Ph.D., U. of California at Davis. Assoc. Prof., Pathology
Smith, Mary C., D.V.M., Cornell U. Assoc. Prof., Clinical Sciences
Summers, Brian A., B.V.Sc., U. of Melbourne (Australia). Asst. Prof., Pathology
Tapper, Daniel N., Ph.D., Cornell U. Prof. Physiology/(Section of Physiology)
Tennant, Bud C., D.V.M., U. of California at Davis. Prof., Clinical Sciences
Thompson, John C., Jr., Ph.D., Cornell U. Assoc. Prof., Preventive Medicine
Timoney, John F., Ph.D., National U. of Ireland. Assoc. Prof., Microbiology
Torres, Alfonso, Ph.D., U. of Nebraska. Assoc. Prof., Diagnostic Laboratory
Trotter, Eric J., D.V.M., U of Illinois. Assoc. Prof., Clinical Sciences
Walton, Donna K., D.V.M., U. of Missouri. Asst. Prof., Clinical Sciences
Wasserman, Robert H., Ph.D., Cornell U. Prof., Physiology/(Section of Physiology)
Wassom, Donald L., Ph.D., U. of Utah. Asst. Prof., Preventive Medicine
Weiland, Gregory A., Ph.D., U. of California at San Diego. Asst. Prof., Pharmacology
White, Maurice E., D.V.M., Cornell U. Asst. Prof., Clinical Sciences
Winter, Alexander J., Ph.D., U. of Wisconsin. Prof., Clinical Sciences/Microbiology
Wootton, John F., Ph.D., Cornell U. Prof., Physiology
Zimmer, James, Ph.D., Cornell U. Asst. Prof., Clinical Sciences

Index

Office of University Publications
784 48M DP


CORNELL UNIVERSITY
BEEBE LAKE
CORNELL PLANTATIONS
CORNELL PLANTATIONS
F. R. Newman Arboretum
University Golf Course
Golf Pro Shop
Moakley House
Airport
Cornell Industry Research Park
Dyce Honeybee Laboratory
Equine Research Park
Laboratory of Ornithology
Laboratory of Radiation Biology
A Lot
CC Lot
B Lot
Robert Purcell Union
North Campus Student Residences
8 Intl. Living
10 Ujamaa
Mary Donlon Hall
Hasbrouck Apartments
Pleasant Grove Apartments
Clara Dickson Hall
Balch Halls
Helen Newman Hall
Fuertes Observatory
Noyes Lodge
Alumni House
Campus Directory
Risley Hall
Anna Comstock House
University Admissions
Thurston Manor
Thurston Court
Seal and Serpent
Cornell University Press
Alpha Phi
Kappa Psi
Zeta Psi
Wait Terrace
Wait Ave. Cooperative
Triphammer Cooperative
Wari Cooperative
Africana Center
Hurlburt House
Kappa Delta Rho
Acacia
Pi Beta Phi
Tau Epsilon Phi
Sigma Delta Tau
Alpha Chi Sigma
Alpha Gamma Rho
Tau Kappa Epsilon
Pi Lambda Phi
Phi Kappa Sigma
Beta Theta Pi
Sigma Chi
Phi Sigma Epsilon
Phi Delta Theta
Zeta Beta Tau
Delta Phi Epsilon
Phi Kappa Tau
Delta Chi
Alpha Zeta
Delta Gamma
Kathryn Phillips House
Delta Delta Delta
Prospect of Whitby
Alpha Sigma Phi
Sigma Nu
Phi Gamma Delta
Sigma Alpha Epsilon
Omega Tau Sigma
Alpha Delta Phi
Kappa Sigma
Phi Sigma Kappa
Chi Psi
Theta Delta Chi
Sigma Phi
Phi Kappa Phi
Kappa Alpha
Pi Kappa Alpha
Pi Kappa Psi
Delta Tau Delta
Delta Upsilon
Sigma Pi
Phi Kappa Sigma
Delta Phi (Llenroc)
Cayuga Lodge
Ivy House
Sigma Phi
Telluride Association
Rock Garden
Willard Straight Hall
Barnes Hall
Campus Store
Sage Hall
Statler Hall
Sage Chapel
Day Hall
Olin Library
Stimson Hall
Uris Library
Morrill Hall
McGraw Hall
White Hall
Lincoln Hall
Goldwin Smith Hall
Tjaden Hall
Sibley Hall
Johnson Museum of Art
BAKER HALLS
A Boldt Tower
B Boldt Hall
C Baker Tower
D North Baker Hall
E South Baker Hall
F Founders Hall
G Mennen Hall
H Lyon Hall
I War Memorial
J McFaddin Hall
UNIVERSITY HALLS
1. Class of '17 Hall
2. Class of '28 Hall
3. Class of '22 Hall
4. Class of '18 Hall
5. Class of '26 Hall
6. Sperry Hall
Noyes Center
Communication Arts Graduate Center
von Cramm Hall
Alpha Tau Omega
Foundry
Suspension Bridge
Rand Hall
Traffic Booth
Baker Lab.
Olin Chem. Lab.
Newman Lab.
Clark Hall
Savage Hall
Bailey Hall
Space Sciences
Big Red Barn
Rockefeller Hall
Andrew D. White Center
Information
R. Uris, Ferrand, Rockwell Gardens
Malott Hall
Hydraulics Lab.
Weinhold Plant
Toboggan Lodge
Van Rensselaer Hall
Caldwell Hall
Comstock Hall
Warren Hall
Plant Science
Garden
Mann Library
Emerson Hall
Fernow Hall
Bradfield Hall
Bruckner Lab.
Rice Hall
East Roberts
Roberts Hall
Stone Hall
Minns Garden
Greenhouses
Mudd Hall
Corson Hall
Academic II
Alumni Fields
Lynah Rink
Teagle Hall
Barton Hall
LRC Conf. Center
Schoellkopf House
Schoellkopf Hall
Schoellkopf Field
The Crescent
Kite Hill
Grumman Squash Courts
Bacon Cage
Hoy Field
Wilson Synchrotron
Oxley Polo Arena and Orthwein Stable
Tennis Bldg.
Wing Hall
Riley-Robb Hall
Livestock Pavilion
Stocking Hall
Morrison Hall
Cornell-USDA Nematode Lab.
Toxic Chem. Lab.
Post Lab.
Insectary
Blauvelt Lab.
Dimock and Virology-Nematology Labs.
Muenscher Poisonous Plants Garden
Greenhouses
Veterinary College
Veterinary Research Tower
Poultry Virus Bldg. Guterman Bioclimatic Lab.
Boyce Thompson Institute
Large Animal Research Teaching Unit
Ruminant Nutrition Lab.
U.S. Nutrition Lab.
Campus Directory
Teaching and Research Barns
Cornell Orchards
Library Annex
Statutory Fleet and Bus Garages
University Print Shop
Chilled Water Plant
Heating Plant
Humphreys Service Building
Traffic Bureau 116
Dept. of Construction
Typewriter Repair
East Ithaca Service Building
Vegetable Crops
Fishery Laboratory
Cornell Quarters
High Voltage Lab.
Village of Forest Home
Wildflower Garden
Robison York State Herb Garden
Comstock Knoll
Plantations Headquarters
Water Filtration Plant
Ornamental Test Garden
Love Lab.
Leland Lab.
Muenscher Lab.
and Greenhouse
Carpenter Hall
Campus Directory
Bard Kimball Thurston Halls
Knight Lab.
Hollister Hall
DeFrees Lab.
Myron Taylor Hall
Taylor Hall
Anabel Taylor Hall
Gannett Center
Olin Hall
Snee Hall
Hughes Hall
Upson Hall
Ward Lab.
Grumman Hall
Phillips Hall
Uris Hall
Ives Hall
Triangle
Lambda Chi Alpha
Chi Phi
Algonquin Lodge
Theta Chi
Young Israel
Delta Kappa Epsilon
Gamma Alpha
Alpha Psi
Elmwood Cooperative
Sheldon Court
Cascadilla Hall
Schuyler House
Sage House
Bailey House
Downtown Ithaca
WHCU-AM-FM and Business District
Ellis Hollow Creek Road
Snyder Hill Road
Turkey Hill Road
EAST HILL PLAZA:
Accounting, Budget
Cornell Federal Credit Union
University Publications
Patents and Licensing
Scale in Feet
500
1000
N
W
E
S
Copyright
Office of University Publications
Cornell University, Ithaca, New York
1983

Cornell University Announcements
USPS 132-860
Office of Admissions
Cornell University
410 Thurston Avenue
Ithaca, New York 14850

Second-class postage
paid at Ithaca, New York