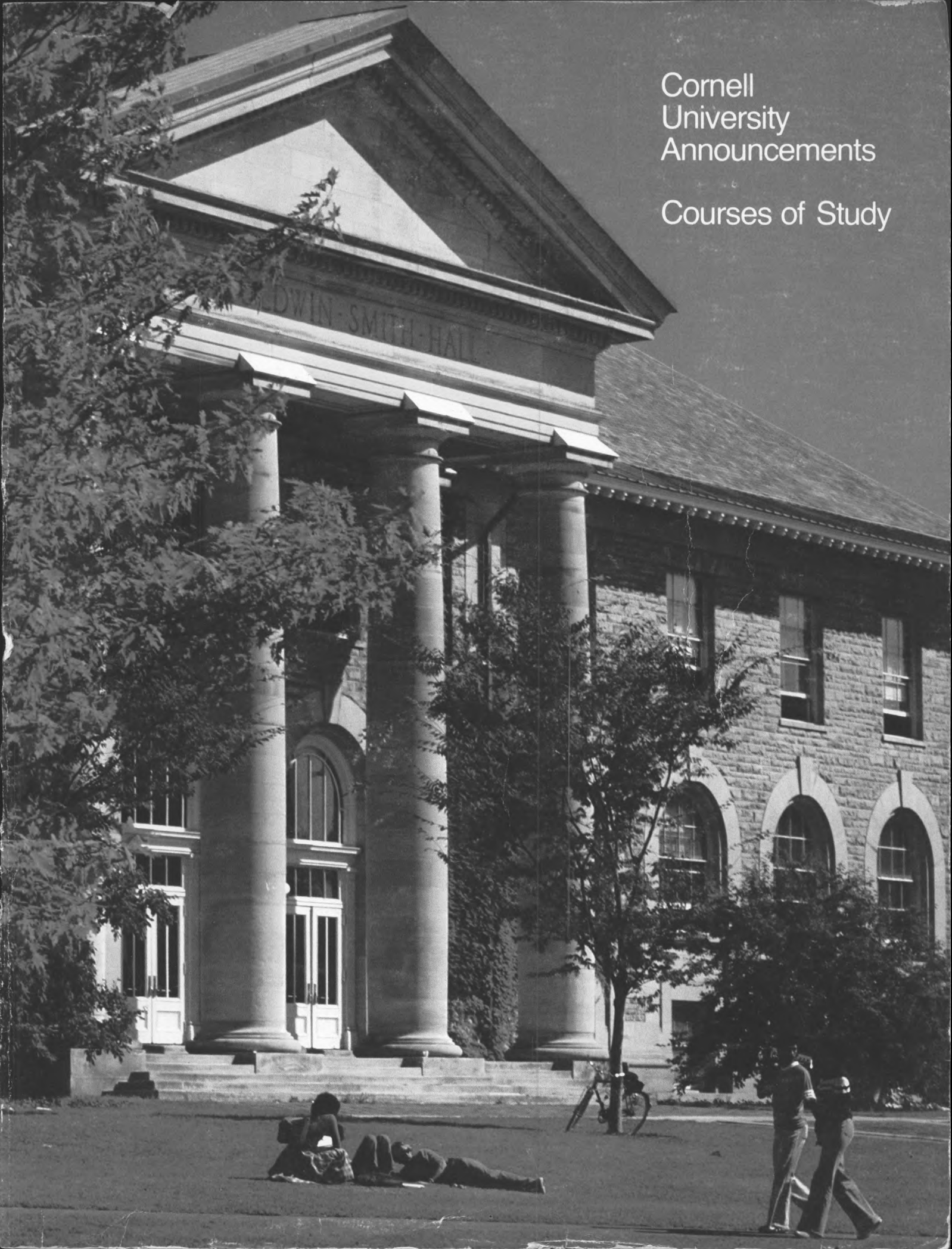


Cornell
University
Announcements
Courses of Study



Cornell University

Courses of Study

1981-82

Cornell University Announcements (USPS 132-860)

Volume 73 of the Cornell University Announcements consists of fourteen catalogs, of which this is number 8, dated July 27, 1981. Issued twice in March, April, June, July, August, and October and once in May and September. 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 1981-82

Fall Semester

Wednesday, August 26

Monday, August 31, and Tuesday, September 1

Wednesday, September 2

Monday, September 7

Monday, September 14

Wednesday, September 23

Friday-Sunday, September 25-27

Saturday, October 17

Wednesday, October 21

Friday and Saturday, November 6 and 7

Wednesday, November 25

Monday, November 30

Saturday, December 12

Wednesday, December 16

Wednesday, December 23

New-student orientation begins

Residence halls open

Registration

Instruction begins, 8:00 a.m.

Add/drop/change period begins

Labor Day, University holiday

Physical education classes begin

Last day of add/drop/change period

Last day for late registration

New-student Parents' Weekend

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

Instruction resumes, 8:00 a.m.

Homecoming Weekend

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

Instruction resumes, 8:00 a.m.

Instruction ends, 1:10 p.m.

Final examinations begin

Final examinations end

Residence halls close

Winter Session

Variable periods between Monday, December 28, and Friday, January 22

Spring Semester

Sunday, January 18

Thursday and Friday, January 21 and 22

Monday, January 25

Monday, February 8

Friday, February 12

Saturday, March 27

Monday, April 5

Saturday, May 8

Thursday, May 13

Friday, May 21

Saturday, May 22

Sunday, May 30

Residence halls open

Registration

Instruction begins, 8:00 a.m.

Add/drop/change period begins

Physical education classes begin

Last day of add/drop/change period

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

Instruction resumes, 8:00 a.m.

Instruction ends, 1:10 p.m.

Final examinations begin

Final examinations end

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

Commencement Day

Summer Session 1982

Three-Week Session

Eight-Week Session

Six-Week Session

Monday, June 2-Friday, June 25

Monday, June 14-Friday, August 10

Monday, June 28-Friday, August 10

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

In this calendar, the University has scheduled classes 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.

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University Administration

Frank H. T. Rhodes, President of the University
W. Keith Kennedy, University Provost
Thomas H. Meikle, Jr., Provost for Medical Affairs
William G. Herbst, Senior Vice President
W. Donald Cooke, Vice President for Research
William D. Gurowitz, Vice President for Campus Affairs
Robert T. Horn, Vice President, Treasurer, and Chief Investment Officer
Robert M. Matyas, Vice President for Facilities and Business Operations
Richard M. Ramin, Vice President for Public Affairs
Alison P. Casarett, Vice Provost
Kenneth M. King, Vice Provost
Larry I. Palmer, Vice Provost
James W. Spencer, Vice Provost
Walter J. Relihan, Jr., Secretary of the Corporation and University Counsel
J. Robert Barlow, Special Assistant to the President
Neal R. Stamp, Senior Counsel to the University
Kenneth I. Greisen, 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 life as a carpenter wandering in search of work. White, the younger, was well educated, a member of America's cultural aristocracy. Cornell came to Ithaca in 1828, worked hard, sometimes failed, more often succeeded, and succeeded to the extent that in the middle 1850s he went out into the American business world. There he met Morse, inventor of the telegraph, became his partner and was himself soon a wealthy man.

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

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

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

White was the University's first president. He had assembled a faculty of distinguished scholars from the United States, Canada, and Great Britain, many of whom, including a prominent Oxford professor, came to Cornell because they regarded the University's approach to education as pioneering, lively, and suited to the needs of the time. What more appropriate then 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. 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 study center at Washington, D.C. More remote is the National Astronomy and Ionosphere Center in Puerto Rico, which has the world's largest radio-radar telescope.

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

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

Frederick G. Marcham
Goldwin Smith Professor of English History emeritus

The Students

Cornell University has a student body of about 17,000 in the eleven schools and colleges at Ithaca. More than 29 percent of the students are engaged in graduate and professional study. The student body is diverse in interests and background, with 51 percent of the undergraduates from New York State, 39 percent from the remaining fifty states, and 10 percent from over ninety foreign countries.

Regional Origin of Students

New England	1,793
New York State	8,565
Mid-Atlantic	2,713
Southeast	471
Midwest	1,229
Southwest/Mountain	313
Farwest	641
Foreign and United States possessions	1,341
Total	17,066*

*Figures are for fall 1980 and do not include extramural students, students registered in absentia, or students in the New York City divisions.

Retention and graduation of undergraduates.

By the fall of 1979, 79.2 percent of the students that entered endowed undergraduate units in 1974 (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) 81.3 percent had graduated or were still working toward a Cornell degree.

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

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

Special opportunity programs. Cornell University administers a variety of special opportunity programs designed to provide financial assistance and other forms of assistance to (1) minority students and (2) low-income students meeting program guidelines. The emphasis of these special programs is to aid in increasing representation of students from minority groups present in New York State who historically have been underrepresented in higher education. However, participation is also available to those residing outside New York State. For details, prospective students contact the Office of Admissions, 410 Thurston Avenue, Ithaca, New York 14850.

Degree Programs

Undergraduate Degrees

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

Graduate Degrees

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

Business and Preprofessional Study

Undergraduate Business Study

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

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

Applied economics and business management.

Economics, marketing, finance, public affairs management, food industry management, resources management, and distribution processes 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, which 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, are studied. Graduates can pursue immediate employment in industry, government, and labor organizations or choose graduate study in industrial and labor relations or such related fields as law and business and public administration.

Related Areas

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

Combined Degree Programs

Because Cornell has the Graduate School of Business and Public Administration, special opportunities exist here 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, Master of Public Administration, or Master of Professional Studies (Hospital and Health Services Administration) degree after the fifth year of study, rather than the normal 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 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 areas.

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 can be considered to be of no value to the lawyer and no undergraduate course of study that can be judged as 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, because of its kinship to guiding legal principles, 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 your 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.

Premedical Study

Medical and dental schools, while not requiring 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, those premedical students who elect a nonscience major are advised to take 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 at Cornell most successful 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 and Arts and Sciences may apply for acceptance into a dual registration program arranged between Cornell University and the Upstate College of Medicine at Syracuse. Students from these two colleges and the College of Human Ecology are eligible for a similar program arranged with the Cornell University Medical College in New York City. Both programs allow registered students to save one year in pursuit of the bachelor's and M.D. degrees. Further information about these programs is available from the Health Careers Program office at the Career Center, Cornell University, 14 East Avenue, Ithaca, New York 14853.

Preveterinary Study

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

The college-level prerequisite courses for admission to the New York State College of Veterinary Medicine at Cornell are one year each of English, biology, physics, and general chemistry, six credits of organic chemistry, four credits of biochemistry, and three credits of 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 Cornell's College of Veterinary Medicine, may vary slightly at other veterinary colleges.

For information on additional preparation, including work experience and necessary examinations, students should consult the *Announcement of the College of Veterinary Medicine*, obtained by writing to Cornell University Announcements, Research Park, Ithaca, New York 14850.

University Resources

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

University Libraries

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

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

At the south end of the Arts Quadrangle is Uris Library, the building with the tower that has become the symbol of Cornell. Uris is essentially an undergraduate library for students in the liberal arts. A principal aim of this library is to bring readers and books as close together as possible. Accordingly, the stacks containing more than 122,000 volumes are open to all, and only reserve books in heavy demand are held in a special category. There are listening rooms where students, singly or in groups, may hear recordings of the spoken word, and there is a lecture room with sound and projection capabilities.

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

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

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

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

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

Cornell's libraries have the largest collection on Southeast Asia in the world, the largest Western-language collection on East Asia, the finest Wordsworth collection, and the finest Icelandic collection in the nation.

Museums and Art Exhibitions

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

The museum's collections are particularly strong in Asian art, nineteenth- and twentieth-century painting, and the graphic arts. Located on Central Avenue, the museum is open daily Tuesday through Sunday, 10 a.m. to 5 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 Fine Arts Gallery in Sibley Hall, and the galleries in Goldwin Smith Hall, Martha Van Rensselaer Hall, and Franklin 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 radar-radio telescope, in Arecibo, Puerto Rico.

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

Theater

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

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

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

Dance

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

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

Lectures

On the more academic side of audience entertainment, there is the lecture. Dozens of extracurricular lectures are given every week, ranging from scholarly presentations on subjects of narrow interest to 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.

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, a salesroom, and a cafeteria.

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

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

The Animal Science Teaching and Research Center was established in 1973 on twenty-five hundred acres of fertile valley and hillside land near Dryden, about fifteen miles from campus. It now houses some 850 head of dairy cattle, 450 beef cattle, and 900 sheep. Nearby 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 Isles of Shoals Laboratory, a marine biology laboratory off the coast of Maine.

Engineering and Physical Sciences

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

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, archeologists, historians, engineers, architects, linguists, accountants, doctors, scientists, students, and faculty in every discipline. Cornell Computer Services 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 several public terminals, provides some free consulting services, produces informative documentation, and offers or cosponsors a variety of user education programs.

Cornell's main computer is an IBM 370/168. An easy-to-use DEC 2060 computer was installed on campus in 1980, and two IBM 4341 computers will become available for public use in 1981, as will more than 100 new interactive workstations. PLATO terminals are available in Uris Hall for instructional computing during regularly scheduled terminal hours. The number of Teraks on campus used for introductory programming courses is expected to double for the fall semester. Three years ago Cornell purchased a Floating Point Systems array processor. This specialized computer is very fast and highly cost effective for long calculations.

Cornell is attached to Telenet and TYMNET, data communication networks which provide computer users access to computing facilities in forty states as well as in 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.

Special Academic Services and Programs

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 a.m. to 5 p.m. The telephone number is 607/256-6200.

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

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

The Writing Workshop

The Writing Workshop, in 150 Rockefeller Hall (telephone 256-6349), offers a range of services for students seeking help with writing.

Tutorials. For those who need an intensive course in composition the workshop offers tutorial classes. Students enroll in either English 137 (offered in the fall semester) or English 138 (spring) and attend one small class session of five to six students and one individual tutorial a week. These courses satisfy the Freshman Seminar requirement and are offered for S-U credit. To register for these courses and arrange class times, call 256-6349 for an appointment to consult a member of the staff.

Walk-In Service. Any student writing a paper may use the Workshop's Walk-In Service, 150 Rockefeller Hall, for help with specific problems encountered as he/she is drafting a paper. The staff will discuss the strengths and weaknesses of any draft on which a student is currently working. Hours are posted outside the workshop's door, in the English department's offices, at the Uris Library reference desk, and at other locations on campus. Appointments are not made; students are assisted on a first-come—first-served basis. For more information telephone 256-6349.

Freshman writing assessment sessions. For entering freshmen the workshop, in conjunction with the Freshman Seminar Program, offers Writing Assessment Sessions during orientation week and the first week of classes. These sessions help students assess their writing abilities and choose an appropriate Freshman Seminar. Consult the orientation newspaper for dates, times, and locations, or contact the Writing Workshop (256-6349) or the Freshman Seminar Office, 260 Goldwin Smith Hall (telephone 256-4061).

Student writers may find *A Writer's Responsibilities*, prepared by the Department of English and distributed through the Office of the Dean of the

Faculty, 315 Day Hall (telephone 256-4843), useful. The booklet shows how to document source material to avoid inadvertent plagiarism.

The Learning Skills Center

The Learning Skills Center (LSC) promotes academic scholarship to help ensure graduation of minority students at Cornell. The LSC provides academic advising, preparatory instruction in core courses, (biology, physics, English, chemistry, and mathematics), and tutorial and study sessions. A pre-freshman year summer program gives new students an opportunity to pursue college courses before fall enrollment. The LSC has study hall accommodations and provides students access to typewriters, calculators, a reserve library, course notes, previous examinations, and tapes. Academic advising, including help in specific areas of study, scheduling, or programming information is provided by LSC staff to all minority students.

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. In addition to the minicourses, audio cassettes on these topics are maintained at the center, in the Listening Room of Uris Library, the Reserve Desk of Mann Library, Room C111 of the College of Veterinary Medicine, and at the three student unions. The Reading and Study Skills Program is located in the Learning Skills Center, 375 Olin Hall (telephone 256-6310).

Tutoring Services

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

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

Field Service and Study Abroad

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

Advanced Placement of Freshmen

The appropriate department of instruction sets the standards of achievement that must be met for advanced placement at Cornell and *recommends* AP credit for those who meet the standards. This recommendation is almost always based on some examination score. The student's college decides whether to *award* the credit. Students need not accept advanced placement. They may repeat the course, thereby relinquishing the advanced placement credit.

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

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

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

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

Foreign credentials. Information regarding Cornell's advanced standing policy for foreign credentials may be obtained by contacting the Assistant Director for Undergraduate Foreign Admissions, Cornell University, 200 Barnes Hall, Ithaca, New York 14853, 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 and 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

Students earning a score of 5 on the CEEB Advanced Placement Examination in biology, or whose performance on the special departmental examination is superior, will receive eight credits and be permitted exemption from all introductory biology courses.

Nonmajors with a score of 4 or 5 on the AP Examination or departmental examination can receive, respectively, six or eight advanced placement credits. This satisfies part or all of the distribution requirement in biological sciences for the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Human Ecology.

Biological sciences majors (and other students who expect to take advanced biology courses) who receive a score of 4 must fulfill the introductory biology requirement by taking Biological Sciences 103–104, or four credits of work in Biological Sciences 105–106 selected with the advice and approval of the instructors.

Students who feel prepared may arrange to take the departmentally administered examination by requesting permission in advance from the General Biology Office, Cornell University, 310 Roberts Hall. This examination is given only once, 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. The college-level chemistry course offered by some secondary schools corresponds roughly to Chemistry 207–208. Chemical Bond Approach (CBA) and Chem Study (CHEMS) are not considered sufficient preparation for advanced placement.

Freshmen may qualify for advanced placement and eight advanced standing credits for Chemistry 207–208 by earning a score of 5 on the CEEB Advanced Placement Examination in chemistry or by passing an advanced standing examination offered by the department. Before taking the special examination, students should consult Professor R. C. Fay. A score of 3 or 4 on the CEEB Advanced Placement Examination earns four credits for Chemistry 207 and placement in Chemistry 208.

Students receiving advanced placement credit for Chemistry 207 or 207–208 who are interested in a major in chemistry or a related science should consider taking Chemistry 215–216 and should consult Professor G. Hammes.

Classics

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

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

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

Economics

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

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

English

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

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

Students who receive scores of 700 to 749 on the CEEB College Placement Test in English composition, 700 to 709 on the CEEB College Placement Test in literature, or 4 on the CEEB Advanced Placement Examination will be eligible to take an advanced standing examination offered by the department during orientation week. 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 Freshman Seminar requirement or the humanities or expressive arts requirement of the College of Arts and Sciences.

If space permits, freshmen who have not received advanced placement credit but whose test scores and 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 grants three credits to students with a score of 5 on the CEEB Advanced Placement Examination in German literature. Students who receive a score of 4 will be awarded three credits if they achieve a grade of B+ or higher in a course in German literature.

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, 295, or 221) or the sequence 214–215–216–217, 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 of 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.

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

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; formerly CEEB Achievement Test) for placement. Language course placement is made using guidelines that match CPT reading scores with various levels of courses. In cases where no CPT exists for a particular language, the Department of Modern Languages and Linguistics designates a professor to handle placement for that language. Students who have had a year of formal study or substantial informal study since they last took a CPT are permitted to take the examination again during orientation week.

Advanced standing credit 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; formerly a CEEB Achievement Test). 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.

For further information 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 will be administered at other times during the academic year. All students interested in taking this examination should consult Professor D. R. M. Paterson. Inquiries may be directed to the Department of Music, Cornell University, 124 Lincoln Hall (telephone 607/256-4097).

Near Eastern Studies

For advanced placement and credit in Hebrew and Arabic, students should consult the Department of Near Eastern Studies, Cornell University, 161 Rockefeller Hall. Advanced placement and credit are determined as outlined below.

Arabic. Placement and credit are determined by departmental examination.

Hebrew. Students who achieve scores of 650 or above on the College Placement Test (CPT; formerly the CEEB Achievement Test) will receive five credits

and may be admitted to Near Eastern Studies 301, Advanced Hebrew. Students showing evidence of knowledge beyond NES 301 will receive six advanced placement credits in Hebrew.

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, consult Professor H. Newhall, 101 Clark Hall. Results of the CEEB Advanced Placement Examination are reviewed individually by the Department of Physics, using the guidelines discussed below.

Physics B. Students earning a score of 4 or 5 may receive eight credits for Physics 101 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. To receive credit in calculus-based physics courses, a student should be eligible for advanced placement or transfer credit in one semester of the mathematics calculus sequence for each physics course credited.

- 1) *C—Mechanics* Students earning a score of 4 or 5 will receive four credits in Physics 112 or 207.
- 2) *C—Electricity and Magnetism* Students earning a score of 4 or 5 may be eligible for four credits in Physics 208, and students earning a score of 5 will be eligible for four credits in Physics 213, but all such students should first meet with Professor R. Cotts, 522 Clark Hall.

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, 113 Clark Hall.

Psychology

Students who have scored well on the CEEB College-Level Examination Program psychology test may receive advanced placement credit in psychology. Those interested in taking further courses in psychology should consult a faculty member in the Department of Psychology, Cornell University, 206 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 5 on the CEEB Advanced Placement Examination in French or Spanish literature.

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

Department	Score	Advanced Placement Credit	Placement
Biology	5 (majors)	8 credits	Placement out of all introductory courses. Satisfies the biological sciences distribution requirements.
	5 (nonmajors)	8 credits	
	4 (majors*)	4 credits* or	Placement out of 109–110. Satisfies the biological sciences requirement.
	4 (nonmajors)	6 credits*	
Chemistry	5	8 credits	Placement out of 207–208. Permission to take 215–216.
	3,4	4 credits	Placement out of 207. Permission to take 208.
Economics			Department determines credit and placement
English	Department uses additional measures. Qualified students are notified.		
French language	4,5	3 credits	Department determines placement.
French literature	4,5	3 credits (and proficiency)	Department determines placement. Students may earn additional credit by taking departmental examination.
German literature	5	3 credits (and proficiency)	Department determines placement.
	4	3 credits if followed by B or better in a German literature course.	
Greek	4,5	Department determines credit and placement based on departmental examination.	
Hebrew	4,5	up to 6 credits	Department determines placement.
American history	4,5	4 credits	Department determines placement.
European history	4,5	4 credits	Department determines placement.
History of art	4,5	Department determines credit and placement.	
Italian	4,5	3 credits (or proficiency)	Department determines placement. Students may earn additional credit by taking departmental examination.
Latin	4,5	Department determines credit and placement based on departmental examination.	
Mathematics BC	4,5	8 credits	Placement out of 111, 112. Permission to take 221 or 293 or 295 or 214–215–216–217.
	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 examinations.		
Physics	Department determines credit and placement.		
Psychology	Department determines credit and placement.		
Sociology	Department determines credit and placement.		
Spanish language	4,5	3 credits	Department determines placement.
Spanish literature	4,5	3 credits (and proficiency)	Department determines placement. Students may earn additional credit

*Majors (and other students who expect to take advanced biology courses) will receive 4 advanced placement credits only after fulfilling the introductory biology requirement by taking 103–104 or 103–208 (both sequences are worth 4 credits) or, with the approval of the instructors, 4 credits of work in 101–103, or 102–104, or 105–106. They will thus receive a total of 8 introductory biology credits (4 advanced placement credits and 4 course credits).

Sociology

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

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

College of Arts and Sciences Regulations

Courses taken at other colleges before matriculation at Cornell may count toward the degree if the appropriate department approves. Such credit is counted as part of the 120 credits required for the degree, but not as part of the 100 credits required in

College of Arts and Sciences courses, unless the department concerned accepts such courses as fulfilling part of the major requirement.

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

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

Further Information

For further information about advanced placement contact the person in the appropriate college or

school listed below. Entering freshmen should have their advanced placement test scores sent to their school or college office.

College of Agriculture and Life Sciences

Ruth K. Stanton
192 Roberts Hall

College of Architecture, Art, and Planning

M. Sophie Newhart
147 Sibley Hall

College of Arts and Sciences

Michele T. Crane
144 Goldwin Smith Hall

College of Engineering

Jane H. Pirkio
170 Olin Hall

School of Hotel Administration

Mary Oltz
137 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

Language Placement Tests

Students who have had two or more years of language study in high school and do not have a recent CEEB College Placement Test reading score must take a CEEB College Placement Test (CPT; formerly CEEB Achievement Examination) in the language they wish to continue at Cornell. If there is no College Placement Test for that language students must arrange a departmental interview. Language placement tests are given at the beginning of each fall and spring semester.

Information about times and places to take placement tests is available in the orientation newspaper, the Office of Guidance and Testing, and the Department of Modern Languages and Linguistics. Students must register for these tests at the Office of Guidance and Testing, 203 Barnes Hall, and pay a \$4 fee. For more information, see the College of Arts and Sciences section on language course placement.

Counseling and Academic Advising Services

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

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

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

Guidance and Testing Center

This center, located at 203 Barnes Hall, offers counseling to Cornell students who desire help in defining their academic or vocational objectives as well as those who are experiencing academic difficulties. After a free initial interview to provide the counselor with relevant background information to help define the nature of the student's problem, the student may be encouraged to take a series of tests (aptitude, interest, personality, and achievement). The fee for this battery of tests is \$30. The student will return in order to have the test results interpreted in follow-up counseling sessions. All counseling and test results are kept strictly confidential. Appointments should be made in advance, Monday through Friday between 8:00 a.m. and 4:30 p.m., by calling extension 256-5044.

Career Center

The Career Center, located at 14 East Avenue across from Statler Hall, is part of the University counseling and advising network. The center, working in cooperation with the college offices, assists all Cornellians, from first-year students to alumni. Its purpose is threefold: to help people organize personal resources in career planning and job hunting, to advise on graduate and professional study, and to offer access to current job markets. It provides information and advice on summer jobs, volunteer activities, internships, overseas study, travel, graduate and professional schools, fellowships for graduate study, minority opportunities, résumé writing, and job-hunting techniques.

The center's facilities, programs, and activities include the following:

A library of over 15,000 items, one of the most extensive career libraries in the country, including information about job-hunting techniques, graduate study, summer and other short-term employment, and career opportunities. Two information specialists assist students in the use of this material.

"The Career Center News," a section that appears weekly in the *Cornell Daily Sun*, informs the campus of job interviews, application deadlines, and career programs.

Programs include speakers, panel discussions, and other events on such subjects as job hunting,

graduate school admissions, fellowships and scholarships, and study and job opportunities abroad.

Employment interviews and job placement. During October and November and again in February and March the Career Center, along with the schools and colleges, provides up to thirty interviewing rooms a day for the hundreds of employers who come to the campus each year to talk with Cornell graduates. The diversity of the University and the quality of the students bring most of the major employers of college graduates to the campus.

Placement bulletins. In addition to bulletins listing jobs, the center publishes and distributes to 3,000 employers a bimonthly bulletin listing the qualifications of students and alumni seeking employment.

Graduate-school recruiting. Cornell students are heavily recruited by graduate schools. The Career Center arranges interviews with admissions directors from various graduate institutions, including the major law and graduate business schools.

Advising and instruction. Instruction is provided on job-hunting techniques and career planning through programs that include résumé critiques and a self-assessment workshop. The staff also advises students on individual problems related to graduate school admissions and fellowships.

Tests. Current bulletins and applications for the Law School Admission Test, the Graduate Record Examination, civil service examinations, dental and medical school admissions tests, and other examinations are available at the center.

Opportunities in education. Teachers and educational administrators may arrange to have dossiers of personal information and recommendations filed with the Educational Placement Office in the Center. For two dollars a set, copies can be sent to prospective employers upon request of either the candidate or the employer.

Minority programs. In cooperation with the Minorities Undergraduate Law Society, the Minority Business Students' Association, the Black Agriculturists, and other minority organizations, the center offers programs on many topics. Representatives from business, industry, government, school systems, and graduate and professional schools who are recruiting minority students make frequent visits to campus. The minorities' adviser at the center keeps students informed about specific careers in business and science in which minorities are currently underrepresented.

Volunteer opportunities. Volunteers can work on campus, in Ithaca, and around the world, with VISTA, in summer camps for disabled children or adults, in work-project camps the world over, with church groups, or in summer schools for the disadvantaged. Such experience is often good background for teaching, social work, and the health professions. Some of these opportunities offer small remuneration, some provide room and board; others may actually require payment.

Internships. A growing number of students obtain valuable career orientation and practical experience through internships. Many have found summer internships through the Cornell Internship Program (CIP), a student organization that works in cooperation with the Career Center, locating internships in business, government, and nonprofit organizations.

Health careers. Advice and guidance are provided to students seeking careers in medicine, dentistry, and other health professions. The Career Center also coordinates the efforts of the Health Careers

Program, a faculty committee that participates in formulating a composite letter of recommendation for each student who applies to medical or dental school.

Handicapped Services

As a University committed to the principle of equal opportunity, Cornell's academic and social resources must be fully available to all who are qualified, including persons with impairment of sight, hearing, mobility, or muscular coordination.

Significant steps toward making its facilities and services accessible to the handicapped have been taken by Cornell. Classes, library services, dining facilities, student residences, guest lectures, and employment opportunities are some of the settings and activities for which accessibility must be assured. Since 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 handicapped can be obtained from the Traffic Bureau and arrangements for accessible accommodations in residence hall facilities are available for individual students.

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

Each school within Cornell University has designated a representative to assist handicapped 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 handicapped students which may be obtained from the Coordinator for the Disabled, 217 Day Hall.

Minority Education (COSEP)

The Committee on Special Educational Programs (COSEP) at Cornell University provides various academic, financial, social, and personal support services for minority students.

COSEP, founded by President James A. Perkins in 1963 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," provides admission opportunities for minority students who want to enroll in one of Cornell's seven undergraduate schools and colleges.

Through various methods, such as recruitment, an orientation and summer pre-freshman year program, tutorial instructional courses, and counseling programs, COSEP provides educational assistance to minority students that historically have been excluded or underrepresented in higher education. The University-sponsored financial aid program supports eligible students with financial assistance, which includes a COSEP scholarship.

The main goals of COSEP are:

- 1) To increase the enrollment of minority students at Cornell;
- 2) To provide supportive services after admission for academic, personal, and social adjustment;
- 3) To raise the retention and graduation rates of minority students; and
- 4) To recommend institutional policy for this group.

State Programs (HEOP and EOP)

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

HEOP gives students who would not be admitted through regular admission selection an opportunity to attend Cornell. The programs provide students with academic supportive services, counseling, and financial aid. 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.

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, and generally serves in any way it can international students and campus groups.

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 and must be filed by March 1.

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 SEMP employment, which is administered by the Office of Financial Aid. However, students holding F-1 visas may accept non-work-study employment on campus for up to twenty hours a week. Due to visa restrictions, foreign students may not accept any off-campus employment without permission of the United States Immigration and Naturalization Service. Questions regarding permission to work should be referred to the International Student Office.

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

Health Requirement

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

Registration

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

Leaves of Absence, Withdrawals, Transfers, Credit Hour Reductions

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

Visa regulations also stipulate that students must carry at least 12 credits each term. Foreign students who are petitioning to drop their course load below 12 credits should contact the International Student Office to determine how such a decision will affect their visa status and financial aid.

Personal Counseling Services

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

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

Empathy, Assistance, and Referral Service (EARS). EARS is a peer counseling service offered through the Office of the Dean of Students (telephone 256-7243).

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

Public Safety Services

Emergencies

Accidents, crimes, fires, and all other emergencies on campus should be reported immediately to the Department of Public Safety, extension 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 are located throughout the campus and can be readily recognized by blue lights above them.

Lost and Found

The central Lost and Found Office operated by the Department of Public Safety is located in G18 Barton Hall and is open from 10:00 a.m. to 4:00 p.m., Monday through Friday, telephone 256-7194. Lost articles are often turned in to the information desks in Day Hall and Willard Straight Hall and other central offices, but all such items are eventually turned over to the 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. Contact the manager of the University Services Bureau at 256-7406.

Support Services Section

The Public Safety Support Services Section provides lectures and orientation to various University groups on topics ranging from general public safety's services to drug abuse, crime prevention, and rape and assault prevention. Contact the manager of the Support Services Section at 256-7302 if interested in these free programs.

Student Life and Activities

Office of the Dean of Students

The primary aim of the Office of the Dean of Students 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); new-student programs; fraternity and sorority advising; and coordination of program activities, including housing for students living off-campus. The office also provides counseling and training, and assists individuals who need to know which University department is best equipped to answer any particular question that may arise during the course of the year. Staff serve as advocates for and as consultants to campus groups serving to resolve problems or improve programs.

In addition, ODS assumes responsibility for organizing and supporting ad hoc groups to examine issues that cut across divisional boundaries, e.g., racism, human relations, and ALERT (Alcohol Education, Research, and Training Committee). Various publications are prepared by the ODS, including the *Cornell Calendar*; *Policy Notebook for Students, Faculty and Staff*; and *Off-Campus Housing in the Ithaca Area*.

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

Housing

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

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

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

Information concerning University housing is available from the Department of Residence Life, Cornell University, Balch Hall.

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 eleven 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 entrees (including one vegetarian entree at both lunch and dinner) each day. In addition, weekly "prime nights" and specials highlight the Co-op Dining Program. Specials may include outdoor barbecues, midnight breakfasts, ice cream sundaes, or the Cross-Country Gourmet dinner series that has won national acclaim. Menus are posted weekly and additional information is available through a special menu information telephone line, 256-DINE.

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

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

The Co-op Dining program is administered by Cornell Dining, 233 Day Hall (telephone 256-5392). Each year, all new and transfer students receive a program description and contract. All terms and conditions of the Co-op Dining program are given in the contract, which should be read carefully by all prospective members 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 three Cornell Dining locations seven days a week, throughout each day. All cash dining units accept cash, Cornellcard, Mastercharge, 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 North Campus 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 after normal working hours. Normal hours are Monday through Friday from 8:30 a.m. to 5:00 p.m. and Saturday from 8:30 a.m. to 12:30 p.m.

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

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

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

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

Expenses not covered by the University Health Services program are: visits to private physicians or private health care facilities; house calls; hospitalization expenses; hospital charges and fees for surgical procedures; fees for eye examinations for glasses; allergy injections; immunization vaccines and inoculations for travel abroad; physical exams for studies elsewhere or for fellowship applications; some expenses for contraceptive, prenatal, or obstetrical care; and expenses connected with illness or injury occurring (a) outside of Ithaca while in transit to and from college, on weekend trips, and on vacations away from Ithaca during the academic year; and (b) during the summer unless 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, which includes a \$20,000 major medical provision. The plan covers hospital care, charges for surgical procedures, consultations with a private physician or specialist if referred by a Health Services physician, expenses connected with illness or injury outside of Ithaca, and limited reimbursement for allergy injections, prescription drugs, and most outpatient services. Students are covered by this plan for the entire twelve months. Only by returning a yearly waiver form, which is mailed with the first bursar's bill or available at Gannett Health Center, the Bursar's Office at 260 Day Hall, and at University registration, will students *not* be covered and *not*

charged for this plan. The cost of this plan for 1981-82 will be approximately \$125 for the entire twelve months and the charge will appear on each student's fall tuition bill. Unless students have other health insurance to supplement medical services provided by the University Health Services, they are *strongly urged* to take advantage of this plan. After the waiver process has been completed, a student may be reinstated if the parent's insurance plan drops the student at a certain age or if the student's marital status changes. Application must be made within thirty days of discontinuation of other coverage.

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

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

Cornell United Religious Work

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

Campus Government

The system of campus government at Cornell consists of four deliberative bodies representing not only the University population as a whole, but 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 23 students elected by the student population, all of

whom are voting members, and has legislative authority over the policies of the departments of Dining, Residence Life, Unions and Activities and the Office of the Dean of Students. It also has authority to review the budgets and actions of these departments. The Employee Assembly is composed of members elected by and representing the exempt and nonexempt employees. 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 divisions of the University.

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

Ombudsman

The University Ombudsman's Office in 201 Barnes 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 stands ready to hear and investigate complaints at any time. The office does not have the authority to reverse decisions or punish anyone. The office does make requests for reconsideration or change in decisions and will advocate an equitable solution when a complaint has merit. In addition to hearing and investigating complaints, the office may investigate problems on its own initiative and report its findings and recommendations to appropriate people in the University.

Judicial System

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

Many judicial cases are resolved by summary decision. In such decisions the judicial administrator proposes a fine or a remedy, or both, which 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 Friday. The *Policy Notebook for Students, Faculty and Staff*, available from the Office of the Dean of Students, details the principles and policies governing campus conduct. For further information consult the staff in the Office of the Dean of Students, 103 Barnes Hall.

A judicial adviser is available, without charge, to provide legal counseling and legal assistance to those accused of violating University rules and regulations, including academic integrity violations. The Office of the Judicial Adviser is not associated with the Cornell Legal Aid Clinic and is not equipped to handle legal problems arising outside the University context. The Office of the Judicial Adviser is located in B19 Day Hall, 256-6492. The hours of this office change each semester and are posted on the office door, along with telephone numbers where an adviser can be reached when the office is not open. Further information about the Office of the Judicial Adviser can be obtained from the Office of the Judicial Administrator.

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 North Campus Union. A partial list of facilities includes dining areas, a browsing library, 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, a dry-cleaning service, service desks where newspapers, magazines, and sundries are sold, a travel office, an art-lending library, and a check-cashing service.

University Unions 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., Sun.—Thurs.
10:00 a.m.—1:30 a.m., Fri. and Sat.
(Building opens for dining earlier)

North Campus Union

7:00 a.m.—midnight, Sun.—Tues.
6:30 a.m.—1:00 a.m., Wed.—Sat.

Fraternities and Sororities

For many students fraternity or sorority life is an integral part of the Cornell experience. There are forty-eight fraternities at Cornell with about 2,500 students, 36 percent of the male undergraduate students, as members. There are twelve sororities, with approximately 1,050 students, 20 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. In addition to

housing and friendships, fraternities and sororities provide opportunities for leadership and personal growth. Most of the fraternity chapters are members of the Interfraternity Council, a student-run board that oversees the many programs associated with fraternities. The Cornell Panhellenic Council is the governing body for the sorority system.

The assistant dean of students and adviser to fraternities and sororities in the Office of the Dean of Students assists fraternities and sororities in developing constructive activities for their members. For information, contact the Dean of Students Office, 103 Barnes Hall (telephone 256-4131) or the Interfraternity Council and Panhellenic Council Office, 210 Willard Straight Hall (telephone 245-5183).

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, sailing, skiing, swimming, synchronized swimming, tennis, track, and volleyball.

Transportation Services

Traffic and Parking

All on-campus parking (except for 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 p.m. A campus bus service operates between peripheral lots and the central campus; several community bus routes connect the University with surrounding residential and commercial areas.

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

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 the University requirement in physical education unless specifically exempted for medical reasons, for military service, for participation in athletics or marching band, or for unusual conditions of age, residence, or outside responsibilities. For students in the class of 1981 or earlier, the requirement is four terms, while for students in the class of 1982 or later, it is two terms of physical education. These requirements should be fulfilled in the first terms of residence at Cornell. Transfer students have the requirement reduced by the number of terms completed in a college of recognized standing before entering Cornell.

Postponements are allowed only by consent of the University Faculty Committee on Physical Education. Students are exempt from fulfilling this requirement only when it is recommended by the Cornell medical staff, or because of unusual conditions of age, residence, military service, or outside responsibilities. Students should check with their respective college offices and the Department of Physical Education and Athletics if they have any questions about this requirement.

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*. This booklet is given to every new student and extra copies are available in the Office of the Dean of Students. In addition to the Campus Code of Conduct, the *Policy Notebook* contains a Statement of Student Rights, a Code of Academic Integrity, the University policy on access to and release of student records, information on the University judicial system, library and motor vehicle regulations, and other policies and regulations.

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

Student Records

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

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 of or validation of the student identification card and the collection of information needed for the student directory and state and federal reports. University registration is held on the dates stated in the University calendar at a time and place announced well in advance of the beginning of each semester.

Late Registration

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

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

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

Late Registration Fee

Late Period	Amount
3 weeks	\$30
4 weeks	40
5 weeks	50
6 weeks	60
After 6 weeks, each additional week	25

Course Enrollment

Course enrollment for the next semester at Cornell takes place partway through the current semester. Dates are announced in advance and are usually posted in the school and college offices. Course enrollment generally runs for two weeks. Each college or school notifies students about special procedures. Students are often expected to meet with their advisers during this two-week period to check that the courses they plan to take will ensure satisfactory progress toward a degree. Students complete an optical mark course enrollment form, then return the form to their college office. The forms are processed and each student is sent a Course Confirmation Statement, listing the courses processed from the enrollment form. Class schedules are distributed later by the college offices, often during the same days as University Registration.

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

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

Course Add/Drop/Change Period

Students may adjust their schedules during add/drop/change periods. The length of the periods varies according to colleges. An optical mark form is completed by the student and signed by both the student's adviser and an appropriate representative of the department offering the course (an instructor, department staff member, or college registrar, depending on the college). The completed and signed form must be returned to the student's college office to be processed. See chart below for course add/drop/change fee.

Late Course Enrollment and Late Add/Drop/Change Fees

Academic Unit	Late Course Enrollment Fee	Late Course Add/Drop/Change Fee
College of Agriculture and Life Sciences	No fee	No fee
College of Architecture, Art, and Planning	\$10	\$10*
College of Arts and Sciences	\$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
Summer Session and Extramural Courses	†	†
Veterinary Medicine	No fee	No fee

*Consult the college office for special considerations and requirements.

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

Class Schedules and Attendance

Class Attendance and Absences

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

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

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, either for the time period 6:30–8:20 p.m. or the period 8:40–10:30 p.m. All such examinations shall be scheduled with the Examination and Room Coordinator in the Office of the University Registrar. Beginning in 1981–82, the dates and times of these examinations must be listed in *Courses of Study* as well as in the *Course and Room Roster*.

Any exception to the above regulations will require permission of the dean or director of the college or school offering the course. 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

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.

Privacy of Records

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

Course Numbering System

The course levels have been assigned as follows:

100-Level Course—introductory course, no prerequisites required, open to all qualified students.

200-Level Course—lower-division course, open to freshmen and sophomores, may require prerequisites.

300-Level Course—upper-division course, open to juniors and seniors, prerequisites required.

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

500-Level Course—professional level (e.g., B&PA, Law, Vet.).

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

700-Level Course—graduate-level course.

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

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

Guide to Course Listings

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

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

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

Group 2: Graduate professional divisions

Business and Public Administration
Law
Veterinary Medicine

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

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

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

Grading Guidelines

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

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

This is how a term average is computed:

Course	Grade	Quality Points	Credits	Product
Chemistry 103	B+	3.3	3	9.9
English 151	C-	1.7	3	5.1
DEA 145	B	3.0	4	12.0
CEH 100	B	3.0	3	9.0
DEA 111	C	2.0	3	6.0
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.

Financial Information

Tuition, Fees, and Expenses

Tuition for Academic Year 1981-82

Endowed Divisions	
<i>Undergraduate</i>	
Architecture, Art, and Planning	\$7,000
Arts and Sciences	7,000
Engineering	7,000
Hotel Administration	7,000
Unclassified	7,000

<i>Graduate</i>	
Business and Public Administration	
First-year student	7,200
Second-year student	6,200
Law School	7,250
Graduate School with special committee chairman from an endowed division	7,000

Statutory Divisions

<i>Undergraduate</i>	
Agriculture and Life Sciences	
Resident*	2,880
Nonresident	4,700
Human Ecology	
Resident*	2,880
Nonresident	4,700
Industrial and Labor relations	
Resident*	2,880
Nonresident	4,700

<i>Graduate</i>	
Graduate School:	
with special committee chairman from agriculture and life sciences, human ecology, or industrial and labor relations	3,300
with major field of study in veterinary medicine	4,960
Veterinary Medicine	
Resident*	4,960
Nonresident	6,350

Summer Session

Per credit	125
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Extramural Division

Per credit	175
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Other Tuition and Fees

In absentia fees	
Graduate	\$200
	per term
Undergraduate	15
	per term
B&PA and Law	\$75
	per term

Excess hours tuition rate for students in statutory units taking extra endowed credits
Per term 168.125

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

Fees and Expenses

Applicants to Cornell pay a nonrefundable \$30 application fee when submitting an application for admission.

Accepted candidates who plan to enroll at Cornell are required to pay a one-time \$50 registration fee by a date specified on the registration coupons that accompany the letter of acceptance. The fee is not applied to tuition charges and is not refundable after the stated due date.

Refund Policies

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

The University makes available tuition insurance that provides refunds in the event of leave of absence or withdrawal for medical or emotional reasons. Complete details regarding this coverage and applications accompany the August tuition bill.

Repayment policy. In addition to refunds for which students may be eligible, those 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

Bills cover charges for the term and list financial aid credit as of the date of preparation. The bill is prepared based on information processed before the beginning of the term. After registration, every effort will be made to correct mistakes.

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 received a financial aid stipend before the billing charges.*

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.*

*A resident is a person whose domicile is in New York State at the time of registration for the term.

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 15 if they plan to register for the fall semester. University policy precludes the use of any 1981-82 financial aid for payment of past-due charges.

The bursar's office acts as a clearinghouse for student charges and credits which are placed directly on a student's bill by several departments and offices of the University. *Since the bursar's office 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, contact the Office of the Bursar, 260 Day Hall, 256-2336.

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 you to read the brochure *Student Financial Aid*, 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, you must be enrolled as a full-time student 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 not awarded on the basis of scholastic merit; it is awarded on the basis of financial need as assessed by the Office of Financial Aid at Cornell.

Applications for the 1982-83 academic year will be available from the Office of Financial Aid in December, 1981. Whether or not they are already receiving aid, undergraduates must submit applications by March 16, 1982. Consult the brochure, *Student Financial Aid 1981-82* for further information.

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

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

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

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. Consult the orientation schedule for dates and times of the session.

Money Management

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

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

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

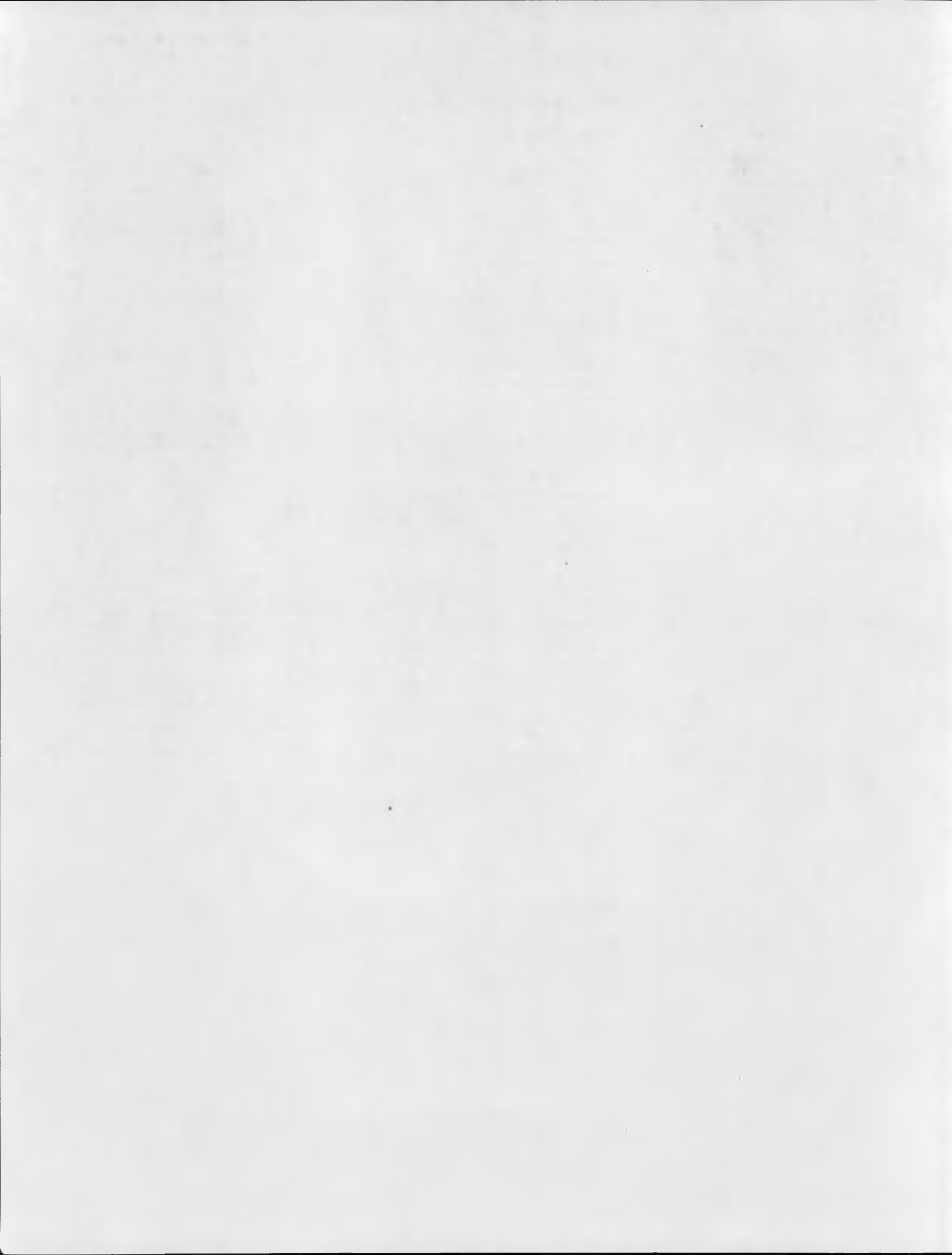
Financial Counseling Services

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

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

Statement of Student Rights and Responsibilities

- 1) Students have the right to be informed of and to apply for all financial aid programs for which they are eligible and 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 the responsibility to notify the University should new resources become available to the student which 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 the responsibility to attend preloan and exit interviews before borrowing and leaving the University. They must repay loans on a timely basis and keep the University informed of their current address.
- 4) Students have the right to be informed of financial aid policies and have the responsibility to be aware of all published financial aid policies and to comply with these policies.
- 5) Students have the responsibility to submit accurate information on all University documents relating to the financial aid application process.



New York State College of Agriculture and Life Sciences

Administration

David L. Call, dean
 Joan R. Egner, associate dean
 George J. Conneman, director of instruction
 Helen L. Wardeberg, associate director of instruction
 Roger P. Natzke, associate director of instruction
 Noland L. VanDemark, director of research and director of the New York State Agricultural Experiment Station (Ithaca)
 Lamartine F. Hood, associate director of research
 Theodore L. Hullar, associate director of research
 Donald W. Barton, director of the New York State Agricultural Experiment Station (Geneva)
 Lucinda A. Noble, director of Cooperative Extension
 David T. Smith, associate director of Cooperative Extension
 Joseph F. Metz, Jr., director of international agriculture

Office of Instruction Staff

Student affairs: D. Burgett
 Minority affairs: Prof. D. Graham, E. Paddio-Reed
 Registrar: R. Stanton
 Scheduling: T. Wakula
 Admissions: N. Cartland, R. Church, M. Grainger
 Career planning and placement: H. Menninger

Department Chairmen

Agricultural economics: O. D. Forker, Warren Hall
 Agricultural engineering: N. R. Scott, Riley-Robb Hall
 Agronomy: R. F. Lucey, Emerson Hall
 Animal science: R. J. Young, Morrison Hall
 Communication arts: D. F. Schwartz, Roberts Hall
 Education: J. P. Bail, Stone Hall
 Entomology: M. J. Tauber, Comstock Hall
 Floriculture and ornamental horticulture: C. F. Gortzig, Plant Sciences Building
 Food science: J. E. Kinsella, Stocking Hall
 Microbiology: R. P. Mortlock, Stocking Hall
 Natural resources: W. H. Everhart, Fernow Hall
 Plant breeding and biometry: W. D. Pardee, Emerson Hall
 Plant pathology: W. F. Fry, Plant Sciences Building
 Pomology: W. J. Kender, Plant Sciences Building
 Poultry science: R. C. Baker, Rice Hall
 Rural sociology: E. C. Erickson, Warren Hall
 Statistics and biometry: D. L. Solomon, Warren Hall
 Vegetable crops: R. D. Sweet, Plant Sciences 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. The quadrangle buildings that house classrooms, Mann Library, offices and laboratories, 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.

The dean's office and other administrative units are located in Roberts Hall. The Office of Instruction is also located in Roberts Hall. Information about academic programs, student records, graduation requirements, career planning, financial aid, admissions, placement, and counseling may be

obtained there. Across the Ag Quad in Warren Hall are computer facilities and the Alfalfa Room, the student lounge and service center of the college.

Advising and Counseling Services

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

The Office of Student Affairs has overall responsibility for coordinating the college advising and counseling program. Inquiries regarding procedures and services should be directed to Dr. Donald Burgett, 17 Roberts Hall (telephone: 256-2257). Students may change advisers if their academic interests change or if they feel their needs can be better served. Change of adviser forms are available from this office.

The Minority Affairs Office in the College of Agriculture and Life Sciences works in conjunction with the University-wide COSEP Program to provide counseling, tutoring, advising, and referrals of minority students to agencies that 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. Interested students should contact the office in Roberts Hall (telephone: 256-6588).

The Office of Career Planning and Placement offers a variety of services to all students and alumni of the college. For further information, contact the office, 16 Roberts Hall (telephone: 256-2215).

The college registrar maintains for each student a permanent, complete, and up-to-date 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 worksheet 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 for students to consult 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 given to the college provide supplemental aid. Awards recommended by the college scholarship committee become part of the total financial package offered through the University's Office of Financial Aid.

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

The Students

The College of Agriculture and Life Sciences undergraduate enrollment is 3,000, with about 60 percent in the upper division. About 850 students are graduated each year; about 600 freshmen and 350 transfer students are admitted. About 330 faculty members serve as advisers for undergraduates. About 1,000 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. The students form an academically select group. About 90 percent were in the upper fifth of their high school graduating classes.

Most students come from New York State, but about 15 percent come from other parts of the United States or abroad. Nearly half of the undergraduates are women. About 7 percent are identified as members of minority or ethnic groups.

Transfer Students

Any student who has withdrawn from one college and has been accepted in the College of Agriculture and Life Sciences 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 institutes, or other two-year institutions. Many of these hold an Associate degree.

A Cornell student in good standing may apply for *intra-University transfer* to pursue a course of study unavailable in their current college. Guidelines are available in the Admissions Office of the College of Agriculture and Life Sciences, 195 Roberts Hall. The procedure includes filing a transfer request in the Office of the University Registrar, 222 Day Hall, and submitting a letter explaining reasons for transfer.

Consideration is given to students who have demonstrated an interest in their intended field of study by taking appropriate prerequisite courses and courses within this area of study. Academic achievement is also considered. Students are seldom allowed to transfer during their freshman year. In some cases, students may transfer directly into the college. In other cases, the student may be referred to the Division of Unclassified Students to study for one semester before entering the college. A second semester is considered under unusual circumstances. During this trial semester, the student must achieve a predetermined average (usually a 2.7) and take approved courses to assure acceptance.

Special Students

A limited number of nondegree 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, contact the Admissions Office, 195 Roberts Hall (telephone: 256-2036).

Part-time Study

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

Degree Programs

Field of Study	HEGIS Code	Department Chairperson	Undergraduate Coordinator	Graduate Faculty Representative
Agricultural Economics†	0111	O. Forker	D. Goodrich	W. Tomek
Business Management and Marketing	0112			
Farm Finance and Management	0110			
Food Industry Management	0112			
Agricultural Engineering†	0903	N. Scott	D. Ludington	G. Rehkugler
Agricultural Engineering Technology	0900			
Environmental Technology	0199			
Agronomy*	0100	R. Lucey		J. Duxbury
Atmospheric Science	1913		B. Dethier	
Field Crops	0102		G. Fick	
Soils Science	0103		T. Scott	
Animal Science†	0104	R. Young	J. Stouffer	D. Quaas
Animal Breeding*				D. VanVleck
Biological Sciences (Div. of)		R. Barker, Dir.		
Biology, General	0401		H. Stinson	
Biochemistry†	0414			K. Moffat
Botany/Plant Biology†	0402			W. Dress
Ecology and Evol. Biology†	0420			P. Marks
Genetics & Development†	0422			S. Zahler
Neurobiology & Behavior†	0425			R. Capenot
Physiology†	0410			R. Wasserman
Communication Arts†	0601	D. Schwartz	D. Schwartz	N. Awa
Education†	0801	J. Bail	G. Posner	K. Strike
Agricultural Education‡	0899		W. Drake	
Entomology†	0421	W. Tauber	E. Raffensperger	W. Tinney
Environmental Toxicology*	0426			C. Wilkinson
Floriculture & Orn. Hort.†	0109	C. Gortzig	G. Good	R. Langhans
Landscape Architecture‡	0204		M. Adleman	L. Mirin
Food Science†	0113	J. Kinsella	J. Sherbon	R. Ledford
General Studies in Agriculture	0101		D. Burgett	
International Agriculture†	0101		L. Zuidema	J. Metz
Microbiology†	0411	R. Mortlock	P. VanDemark	P. VanDemark
Natural Resources†	0115	H. Everhart	R. Morrow	R. Oglesby
Aquatic Science	0107		R. Oglesby	
Nutrition* (Div. Nutr. Sci.)	0424	M. Nesheim, Dir.		L. Wright
Plant Sciences, General	0402		L. Topoleski	
Plant Breeding†	0116	W. Pardee	C. Lowe	V. Gracen
Plant Pathology†	0404	W. Fry	J. Lorbeer	M. Zaitlin
Plant Protection†	0116		P. Arneson	P. Arneson
Pomology†	0108	W. Kender	W. Kender	F. Liu
Vegetable Crops†	0108	R. Sweet	W. Kelly	P. Minotti
Rural Sociology	2208	E. Erickson	E. Erickson	
Development Sociology*				F. Young
Statistics & Biometry†	0419		W. Federer	S. Searle

* = Graduate only

† = Graduate and undergraduate

‡ = Certificate/license

Degree Programs

The College of Agriculture and Life Sciences offers programs leading to the degrees of Bachelor of Science, Master of Science, and Doctor of Philosophy as well as several professional degrees including the Master of Professional Studies and the Master of Arts in Teaching and some registered professional licensing or certification programs.

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

Requirements for 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.

In order to graduate from the college, the student must:

Complete a minimum of 120 credits of formal course work

Course credit must fall within the following pattern:

Distribution: 45 credits

Physical sciences—9 credits, including 6 credits of mathematics or chemistry or physics.
Biological sciences—9 credits, including 6 credits of introductory biology.

Social sciences and humanities—9 credits in at least two subject areas.

Oral and written expression—9 credits, including 6 credits of written expression.

9 credits selected from any of the above groups, for a total of 45 credits.

The basic competencies and skills needed for the various courses of study are usually met through selected courses that fulfill the Distribution requirement. Students should consult their faculty advisers to be sure necessary prerequisite courses have been selected.

Electives: 75 credits

Statutory college electives—55 credits, including at least 45 from the College of Agriculture and Life Sciences. These electives should be planned to meet requirements of the program area or specialization. Core and sequence courses for the various programs of study are described on pages 27–32.

University electives—20 credits, taken in any college (including the College of Agriculture and Life Sciences), to complete either the course credit or the specialization requirements or both. Students who take more than 20 credits in the endowed division are charged excess tuition (currently \$145 per credit hour).

Matriculate in the college as a full-time student enrolling for and satisfactorily completing a minimum of 12 credits each term.

Normally, 8 terms of residence are required to complete the degree. The typical program is 15 credits a term for 8 terms. A maximum of 15 hours a semester may be transferred for full-time attendance at another college, but at least 60 credits must be taken at Cornell. The intra-university transfer student must complete a minimum of two semesters in agriculture and life sciences and complete 30 credits, at least 20 of which must be earned in courses taught in the college.

Maintain a cumulative and last term grade point average (GPA) of 1.7 or above.

Only grades earned at Cornell and while registered in CALS are included in the cumulative average. A student who fails to obtain the minimum cumulative average of 1.7 or a final term average of 1.7 and who

wants to qualify for the bachelor's degree must complete, with an average of at least 1.7, a minimum of 6 credits in the Cornell Summer Session or a minimum of 12 credit hours in a regular term in the college. To graduate in fewer than 8 terms, a cumulative average of at least 2.0 is required.

Satisfactorily complete the University requirement of two terms in physical education in the first year of residence, unless specifically exempted.

Transfer students receive credit toward 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 college registrar.

Students who have been in residence for 8 semesters and who have met the graduation requirements will be graduated. Students are entitled to the full 8 semesters even though they may have completed the graduation requirements. A student who wants to continue study after graduation must apply for admission as a special student.

Special Academic Opportunities

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 interested in these or other year-abroad programs may obtain additional information from the Office of Student Affairs. *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 graduation requirements at Cornell in the normal time period.

Mexican exchange program. A student from the college is competitively selected in the freshman year to go to the Instituto Tecnológico y de Estudios Superiores de Monterrey during the junior year. The sophomore year is used to attain proficiency in the Spanish language. Scholarship assistance from Monterrey and Cornell provides a substantial portion of the costs of the program. A student from Monterrey attends 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 with support from 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) are less than at Cornell.

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

Honors Programs

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 want to enroll in the honors program must have completed at least 55 semester hours of course credit, at least 30 of the 55 at Cornell. Also, the student must have attained a cumulative grade point of at least 3.00 at the time of entry. Interested students must make written application no later than the end of the third week of the first semester of the senior year on the application form available from the college registrar, 192 Roberts. The registrar will verify the student's grade point average and formally enroll the student in the program.

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

The honors committee for each area recommends to the college registrar those students who qualify for honors. Only those who maintain a GPA of at least 3.00 will be graduated with honors.

Honors programs are offered in 7 subject areas. The programs are described by area.

Animal Science

Faculty committee: W. R. Butler, chairman; R. C. Gorewit, P. J. VanSoest

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 committee will interview each candidate regarding his or her 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 (2 semesters before graduation), students are encouraged to make prior arrangements with faculty supervisors.

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

Biological Sciences

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

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 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. Students are expected to participate actively question or comment during the seminars.

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 typewritten 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 anonymously by two 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. M. Raffensperger, chairman; E. H. Hagedorn, W. T. Johnson

An honors program in the area of entomology may be pursued by any qualified student in the college. 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 patterns provide the raw material for honors study. Cornell's extensive library in entomology is another major asset if entomology is selected 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. (The college 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.
- A brief progress report, approved by the project adviser, will be submitted to the entomology honors committee by mid-term of the semester in which the student will complete his or her graduation requirements.
- A final project report should be approved by the faculty honors project adviser and be presented 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

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 requires the guidance and supervision of a faculty member with substantial interest or expertise in the problem area chosen.

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

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

Physical Sciences

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

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 before the end of instruction of the semester in which they expect to graduate.

Details of the program can be obtained from the chairman of the physical science honors committee.

Plant Sciences

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

Completion of the honors program in plant sciences requires two copies of a report of independent research in the honors program to be submitted to the chairman of the honors committee.

The report should be written in the format of a research publication required by that discipline by a letter of recommendation from the supervisor of the research, which should reflect the supervisor's familiarity with the research, give an evaluation of the performance, and recommend 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 placed in Mann Library.

Social Sciences

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

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

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

Academic Procedures and Policies

The Scheduling Office, 153 Roberts Hall, provides course enrollment forms and directions, *Course and Time* and *Course and Room Rosters*, course and examination schedules, University Announcements, and other general information. Typically, students pick up materials from the scheduling office, plan a schedule of courses in consultation with their adviser, and return the completed forms to the scheduling office for verification and processing by the University computer system. Selection of specific laboratory or seminar 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 of, the choice of courses made and is required before the course enrollment can be processed.

Registration and Course Enrollment

At the beginning of each term, each student must register first with the University and then with the College of Agriculture and Life Sciences. Registration notifies both the University and the college that the student is present and eligible to enroll in courses.

To enroll in courses, the student completes a course enrollment form and three schedule cards—one for the student, one for the adviser, and one for the scheduling office.

Transfer students should come to the campus before the beginning of their first term in residence and prepare, in consultation with their adviser, an appropriate schedule of courses.

Continuing students. During an officially designated two-week period near the middle of each semester, students already registered in the college plan and submit their course schedule for the next term. Students who delay enrolling for courses until the beginning of the term are less likely to be placed in the courses and sections of their choice.

Students should plan their schedules realistically and not expect to make wholesale changes at the beginning of the next term. Course enrollment forms and schedule cards filed with the Scheduling Office should be considered final.

Schedule Requirements

First-Year Students

- Must enroll in at least 12 credits each term; may not enroll for more than 18 credits in addition to physical education

- Should include one course in each of the following: mathematics, chemistry, or physics; freshman humanities; introductory biology; agriculture and life sciences electives; physical education
- May include another course acceptable in meeting the college distribution requirement or an introductory course in their program area or specialization

Continuing Students

- Must, in immediately subsequent terms, take any course not satisfactorily completed that was taken to meet a specific requirement
- Must enroll for at least 12 credits each term
- Must include at least one agriculture and life sciences course each term until the 45 agricultural-college credit requirement has been completed

Special Students

- Must schedule at least two-thirds of their work each term in subjects offered in the College of Agriculture and Life Sciences.

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

To enroll in courses that involve independent study, teaching, or research or a combination of these, the student must complete an Independent Study Statement, available in 153 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.

Course Changes (Add/Drop/Change)

Students receive a grade for those courses for which they enroll *unless they officially change such enrollment*. All changes in courses or credits or grading option must be made by the student at the scheduling office in Roberts Hall, on an official form provided for that purpose. Changes on the official class lists are made by the Scheduling Office only when a student submits a properly signed course change form. Advisers authorize changes only when it appears to be in the best interest of the student and the program being pursued. Wholesale changes are discouraged.

An official add/drop/change period is designated each term on the University calendar. Changes in courses may be made during this period (usually the first three weeks of the term) 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.

After the last day of the official add/drop/change period, course changes are made only upon the approval of the Committee on Academic Achievements and Petitions. A special petition form for course changes is available in the Scheduling Office in Roberts Hall. Through the end of the sixth week of the term, requests for course changes that seem reasonable and are recommended by the adviser are generally approved. However, if an illegal schedule results, petitions are generally denied unless very unusual circumstances are present.

Beginning with the seventh week of the semester, 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 before that time. Failure in a course is not considered an excuse for dropping it.

Off-Campus Study

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

Programs in which students study off-campus but enroll for Cornell credit include SEA semester, field study in Human Ecology or I&LR, Albany interns, Washington experience, student teaching, IPM interns, clinical microbiology internship. An Intent to Study Off-Campus form is available from the college registrar in 192 Roberts Hall. All students intending to receive Cornell credit for work done off-campus should file this form with the college registrar at the time of enrolling for courses to ensure proper registration will occur. In some programs, adjustment in tuition is made to compensate for the reduced use of on-campus facilities.

Students who plan to enroll in courses at another institution in the United States or abroad, including those participating in the exchange program, petition to register for study in absentia. The petition form is available in the Office of Student Affairs, 17 Roberts Hall. The course of study which 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 a term may be transferred for study in absentia.

Academic Achievement and Progress

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

- Receives and acts upon petitions from individual students asking for exceptions from particular academic regulations or requirements of the college or for consideration of action previously taken by the committee.
- Reviews at the end of each semester, and at other times as shall seem appropriate to the committee, the progress of all students in meeting academic requirements.
- In case of students not making satisfactory progress, takes appropriate action, including, but not limited to, the following: issue warnings to students, suspend them, decree that they may not reregister, grant them leaves of absences, and allow them to withdraw.
- Acts upon readmission requests from persons whose previous enrollment was terminated by the committee.
- Notifies the petitioner in writing of the action taken by the committee and sends a copy of such notice to the student's adviser.

Academic Deficiency

The Committee on Academic Achievement and Petitions reviews the records of those students who in any respect are failing to meet the academic requirements of the college or who persistently fail to attend classes. In general terms, regular participation in course work with academic loads at a level sufficient to assure graduation within eight semesters and grades averaging C- or higher are *prima facie* evidence of satisfactory progress.

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

- semester quality point average of at least 1.70
- cumulative quality point average of at least 1.70
- passing 12 or more credits in academic subjects each semester
- normal progress toward meeting the University's requirement for physical education
- 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 to 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 feels he or she has grounds to be exempt from a college academic regulation may submit a petition. Petition forms are available in the college registrar's office and in the Office of Student Affairs.

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. One 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 State Education Board and is assigned a national Higher Education General Information Survey (HEGIS) code for federal and state reporting. Graduate study is organized by fields, which may draw faculty from several disciplines and departments in the colleges of the University. Major and minor subjects offered in each field are described in the *Announcement of the Graduate School*.

In 1973, to facilitate the student's choice of a major field of study, the many undergraduate options and specializations offered by the CALS were organized into 8 broad but relatively homogeneous program areas: agricultural and biological engineering, animal science, applied economics and business management, behavioral and social sciences, biological sciences, environmental studies, food science, and plant sciences. A ninth area accommodates a cluster of special programs.

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

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

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

Agricultural and Biological Engineering

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

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

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

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

Agricultural Engineering Technology offers the student opportunities to take courses in such areas as agronomy, agricultural economics, natural resources, and animal science as well as plant

physiology, food science, genetics, and microbiology. The emphasis is on technical aspects of the production of food, feed, and fiber.

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

Specific course requirements for agricultural engineering technology are:

A) Basic Subjects	Hours
1. Mathematics, including one semester of calculus	6
2. Chemistry	6
3. Physical sciences	
a) Physics (if no previous high school physics)	8
b) Application of Physical Sciences (Agricultural Engineering 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. Agricultural engineering technology	
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:

Basic Subjects	Credits
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
Advanced and Applied Subjects	Credits
1. Technology:	
a) Agricultural Engineering 371	3
b) Agricultural Engineering 475	3
2. Environmental sciences: Three courses selected from biochemistry, limnology, microbiology, natural resources, soil and water conservation or atmospheric sciences.	9
3. Social sciences: Two courses selected from economics, government, law, or sociology	6
4. Environmental engineering: Two engineering waste-management courses at the 450 level or above.	6

Animal Sciences

Students in this program area study the breeding, care, and production of dairy and beef cattle, horses, poultry, pigs and sheep. Basic and biological sciences are applied to animal industries to increase the supply of food and other products by animals. The animal science program is offered jointly by the Departments of Animal Science and Poultry Science. It is housed in Morrison Hall with some facilities also in Rice Hall. The Animal Science 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, turkeys, 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 both 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. Those whose interests and abilities warrant it usually are urged to emphasize the basic physical and biological sciences. This emphasis provides preparation for graduate study, admission to veterinary college, or careers in teaching or research in the more specialized disciplines of animal science.

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

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

Applied Economics and Business Management

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

The program in applied economics and business management is based in the Department of Agricultural Economics and housed in Warren Hall. The program includes six core courses in the Department of Agricultural Economics and additional courses in an optional area of concentration. Students with outstanding academic records may apply to coregister in the Graduate School of Business and Public Administration in their senior year. For information, contact the Admissions Office, 315 Malott 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, 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.

Behavioral and Social Sciences

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

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

Communication Arts

Students study the fundamentals of communication theory and the most effective means of adapting this theory to written, interpersonal, audio, and visual communication. The curriculum is based on a strong foundation in agriculture, life sciences, and the humanities. In addition to communication arts courses, all students will take 12 credits in a concentration in another College of Agriculture and Life Sciences department, or 12 credits from a variety of college departments if the courses fall within a field and are approved by the adviser. Communication courses are carefully integrated with those in other disciplines to provide a variety of intellectual, cultural, and social perspectives.

Students are strongly encouraged to seek practical communication experience in the student media or through part-time or summer work. A portfolio of professional materials is invaluable in securing employment after graduation. Each student is expected to select one of the following sequences: the agriculture and life sciences communication sequence, the interpersonal communication sequence, or the publication sequence. Each sequence requires an 18-credit core of introductory courses in writing for the media, theory of human communication, introduction to mass media, visual communication, oral communication, and communication law. An additional 11 to 12 credits of other communication courses are required depending on the sequence chosen. Guidelines for the electives in each sequence are available from the department office, 307 Roberts Hall.

Education

The focus in the Department of Education is on how teaching and learning take place in school and nonschool settings, as well as the role of education in our society. Students study concepts and develop competencies necessary to analyze educational situations critically and to plan, implement, and evaluate changes in educational programs in an effort to increase understanding of the substance and process of education so that human potentialities can be realized.

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

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

For the education specialization each student, in consultation with an adviser, plans a program that includes:

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

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

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

Rural Sociology

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

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

Biological Sciences

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

Areas of concentration include general biology; animal physiology and anatomy; biochemistry; botany; cell biology; ecology, systematics and evolution; genetics and development; neurobiology and behavior; and an independent option. Programs of study are described under the Division of Biological Sciences, page 00.

Microbiology

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

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

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

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

Nutritional Sciences

The Division of Nutritional Sciences, an intercollege unit administered jointly by the College of Human Ecology and the College of Agriculture and Life Sciences, coordinates undergraduate teaching related to nutritional sciences. Students are admitted to the undergraduate major in nutritional sciences through the College of Human Ecology.

Students in the College of Agriculture and Life Sciences who want to develop a concentration in nutritional science should consult an adviser in the division. Related study in the college includes food science, food industry management, animal sciences (nutrition), and microbiology. For more information and descriptions of the programs of study see Division of Nutritional Sciences.

Environmental Studies

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

Atmospheric sciences provides students with the basic principles of meteorology and the knowledge needed to understand environmental problems related to field crop production, soil management, and the atmosphere. The program includes practical

and theoretical aspects of meteorology and climatology. Graduates from this area of specialization should have the training necessary to work in national agencies, state environmental groups, and private industry focusing on the interactions between the atmospheric environment and cultivated crops and livestock. Undergraduate education in this program is based upon training in both the physical and biological sciences. The freshman and sophomore years of study include a year and a half of calculus and a year each of physics, chemistry, and biology. The junior and senior years of study in atmospheric sciences would qualify the student for employment as a meteorologist. Also during the junior and senior years students would acquire background in plant physiology, ecology, agronomy, agricultural economics, and natural resources. To provide additional depth in the agricultural sciences, the program requires the student to elect additional courses in one of the following fields: animal science, entomology, floriculture and horticulture, plant pathology, pomology, and vegetable crops.

Soil science provides students with background in the basic principles of soil science and the capability of solving soil problems, taking into consideration the soil's use and environment. The program combines basic training in physical and biological sciences along with a thorough background in agronomy.

Students take 15 credits in agronomy, 10 credits in the physical sciences, and 8 credits in the biological sciences.

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

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

Landscape Architecture affiliated with the Department of Floriculture and Ornamental Horticulture, is cosponsored by the College of Architecture, Art, and Planning. The program offers a first professional degree curricula 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 which begins in the fall semester of the sophomore year. Transfer applications from other Cornell units or other colleges and universities are considered for fall term

admission and, because of the six-semester design studio requirement, students enter the program at the second-year level.

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 66-credit core curriculum and an approved summer internship.

Curriculum

First Year—Fall Term

	Credits
*LA 220, Principles of Landscape Architecture	2
*LA 221, Principles of Landscape Architecture Seminar	1
†Arch 141, History of Architecture I	3
†Bio S 109, Biology for Nonmajors	3
†Distribution elective in mathematics, chemistry, or physics	3
†Freshman humanities elective	3
	15

First Year—Spring Term

†Arch 142, History of Architecture II	3
†Bio S 110, Biology for Nonmajors	3
†Distribution elective in mathematics, chemistry, or physics	3
†Freshman humanities elective	3
†Distribution elective	3
	15

Second Year—Fall Term

*LA 201, Design I: Basic Landscape Architectural Design	5
*Flor 313, Woody Plant Materials for Landscape Use	3
*Ag Eng 221, Plane Surveying	3
†C Art 301, Oral Communication	3
	14

Second Year—Spring Term

*LA 202, Design II: Basic Landscape Architectural Design	5
*LA 310, Site Construction I	4
*Flor 210, Perspective Drawing	3
*LA 224, Plants and Design	3
	15

Third Year—Fall Term

*LA 301, Design III: Intermediate Landscape Architectural Design	5
*LA 311, Site Construction II	4
*LA 521, History of Landscape Architecture I	3
‡CEE A685, Physical Environment Evaluation or CRP 462, The American Planning Tradition	3
	15

Second Year—Spring Term

*LA 302, Design IV: Intermediate Landscape Architectural Design	5
*LA 522, History of Landscape Architecture II	3
†Geol 101, Introductory Geological Sciences	3
†Distribution elective	3
†Distribution elective	3
	17

Fourth Year—Fall Term

*LA 400, Senior Thesis Project Seminar	1
*LA 401, Design V: Advanced Landscape Architectural Design	5
*LA 531, Regional Landscape Inventories and Information Systems	3
‡CEE A687, Image Analysis I: Landforms	3
*Ag Ec 320, Business Law	3
	15

Fourth Year—Spring Term

*LA 402, Design VI: Senior Thesis Project	5
‡LA 532, Analysis and Use of Vegetation in Comprehensive Land Planning	3
†Distribution elective	3
†Distribution elective	3
	14

Summary of Credit Requirements

*Specialization requirements	66
†Distribution electives	45
‡Free electives	9
Total	120

Master of Landscape Architecture (MLA) Degree Curricula

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 an initial curriculum sequence intended to develop basic landscape architecture 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 subject 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.

Curriculum

First Year—Fall Term

	Credits
*LA 201, Design I: Basic Landscape Architectural Design	5
*LA 220, Principles of Landscape Architecture	2
*LA 221, Principles of Landscape Architecture Seminar	1
*Ag Eng 221, Plane Surveying	3
*Flor 313, Woody Plant Materials for Landscape Use	3
*LA 520, Contemporary Issues in Landscape Architecture	2
	16

First Year—Spring Term

*LA 202, Design II: Basic Landscape Architectural Design	5
*LA 310, Site Construction I	4
*Flor 210, Perspective for Landscape Architects	3
*LA 224, Plants and Design	3
	15

Second Year—Fall Term

*LA 301, Design III: Intermediate Landscape Architectural Design	5
*LA 311, Site Construction II	4
*LA 521, History of Landscape Architecture I	3
*LA 621, Summer Internship Seminar	2
‡Free elective	1-3
	15

Second Year—Spring Term

*LA 500, Graduate Landscape Architecture Design Studio	5
*LA 522, History of Landscape Architecture II	3
‡LA 532, Analysis and Use of Vegetation in Comprehensive Land Planning	3
‡NR 300, Natural Resources Inventories	3
	14

Third Year—Fall Term

*LA 501, Graduate Landscape Architecture Design Studio	5
*LA 531, Regional Landscape Inventories and Information Systems	3
*Ag Ec 320, Business Law	3
†CEE A687, Image Analysis I: Landforms	3
‡Free elective	1-3
	15

Third Year—Spring Term

*LA 800 Thesis Research and Preparation in Landscape Architecture	9
‡Free elective	3
‡Free elective	3
	15

*Specialization requirements

†Distribution electives

‡Free electives

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 program are to permit students to conduct research in the multidisciplinary areas relating to landscape architecture and to provide advanced education and training to individuals who decide, upon graduation, to teach, to practice, or to conduct applied research in landscape architecture. To further these objectives, students are permitted considerable flexibility in establishing programs which take full advantage of the teaching and research resources of the university.

Students admitted to the two-year M.L.A. Program are required to complete 60 credits of course work. This must include at least two advanced studios or workshops, a graduate seminar, a colloquium on contemporary issues in landscape architecture, and a thesis or final master's project.

Natural Resources

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

The 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.
- 5) Identifying and measuring the environment: taxonomy, resource inventory, air photo interpretation.
- 6) Learning and developing basic life skills: communication, thinking, making decisions, logic, planning, philosophy, ethnics and others.
- 7) Learning special skills: mathematics, statistics, computer science, resource management, law, etc.
- 8) Learning about the world: Students should recognize that not all learning takes place in the classroom. Exploring different careers, participating in campus and community activities, and independent research all contribute to continuing growth.

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

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

Food Science

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

The core is designed to meet minimum guidelines of the Institute of food technologists, the professional society of U.S. food scientists. The student thus has an opportunity to become well-prepared for a career in food science. The flexibility of the food science program allows students to prepare for a variety of positions in industry, government, or education. Some of the positions and areas of work require graduate training, and it can be useful in others as well. Opportunities for graduate study exist at a number of universities, including Cornell.

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

During the first two years students take courses in biology, chemistry, physics, microbiology, and introductory food science as well as making progress in meeting general college requirements. During the last two years, students take courses dealing with the application of science and technology to the processing, preservation, distribution, and utilization of foods.

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

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

Students are strongly encouraged to obtain further competence in one or more areas of emphasis. Lists of recommended courses are available for many areas but the student is free to select courses for special objectives. The areas of emphasis include

processing technology; food chemistry; nutritional aspects of processing; technology and management; dairy science; meat, poultry, and fish technology; food microbiology; and international food development.

Plant Sciences

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

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

Agronomy

Field Crops. Courses required for all students specializing in field crops (agronomy) include general biology, botany, plant physiology, general chemistry, organic chemistry, mathematics, crops, and soils. Students who anticipate a career in agricultural production or service after completion of the B.S. degree should take additional courses in crops, soils, crop physiology, agricultural economics, communications, 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, botany, qualitative, quantitative, and experimental chemistry; calculus; physics; and statistics.

Floriculture and Ornamental Horticulture

Horticultural science is applied to the production and marketing of florist, nursery and turfgrass crops, and to the selection of plants for both the outdoor and interior landscapes as well as to plant management in these environments. Students may specialize in greenhouse and nursery crop production, turfgrass management, landscape contracting and maintenance service, retail and wholesale marketing of nursery and florist products and services, horticultural business management, and related areas. Many students choose to pursue a general program in floriculture and ornamental horticulture and include course work in all of these specializations. Similarly, programs may be designed to prepare for teaching, cooperative extension, and communications careers in horticulture. Students wishing to prepare for graduate study in horticulture may develop a program in basic sciences and their application in horticultural science.

In consultation with the faculty adviser, each student tailors a program to achieve individual educational objectives in floriculture and ornamental horticulture. Students also are encouraged to take courses in these areas: agricultural economics and business management, agricultural engineering, agronomy (soils), ecology, entomology, plant pathology, plant physiology, oral and written expression, 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 problem and work experience programs.

General Plant Science

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

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

Undergraduates are encouraged to obtain practical experience. This may involve research under the direction of a faculty member or work in a commercial industry, research institute, or on a farm. The departments 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; a biological research technician; a technical representative for agricultural industry; a cooperative extension agent; a plant protection technician; or a 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 62–70 hours 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.

Special Programs and Career Options

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

Cooperative Extension

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

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

- 1) Each student must complete 15 credits or more in oral communication, written communication, psychology, and sociology with at least one course in each area. Freshman Seminars may not be used to fulfill the written communication requirement. It is strongly suggested that students also complete courses in education, particularly in curriculum development and adult education.
- 2) Students choose one of the specializations listed below and will 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	T. Scott
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 will 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 as assigned as follows:

Plant sciences	E. Schaufler
All other areas	G. Broadwell

General Studies in Agriculture

This specialization allows students to design courses of study suited to their individual interests, abilities, and objectives (1) for general education in agriculture or agricultural science; (2) for temporary classification to help them define vocational interests and goals; or (3) for independent study in a specialized field not encompassed by the existing program areas. For example, undergraduates in the college 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 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. The Office of Student Affairs maintains 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 agriculture, with a foreign language, and with various world areas for which study programs exist.

Students must complete course requirements for an agricultural specialization and for a secondary specialization in international agriculture. Courses include Comparative Rural Societies, Economics of Agricultural Development, and electives in the physical and biological aspects of tropical agriculture (such as Geography and Appraisal of Soils of the Tropics; Livestock Production in the Warm Climates; and Tropical Agriculture); and world area studies. Contact L. Zuidema, telephone 256–3035.

Statistics and Biometry

Statistics is concerned with quantitative aspects of scientific investigation: design, measurement, 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. Contact Prof. W. Federer for information (telephone 256–5488).

Description of Courses

Undergraduate and graduate courses in the college are offered through the 17 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 5 Basic Review Mathematics Fall or spring. 3 credits (this credit is not counted toward the 120 credits required for the degree). Primarily for entering student.

Fall: M W F 8 (two sections) or 12:20 (two sections). Spring: M W F 12:20 (two sections). 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 27 Introduction to Farm Techniques Fall or spring. Noncredit. Grade does not appear on transcript. For permission to register, contact the Office of Career Planning and Placement, 16 Roberts Hall.

Fall: T or W 2-5. Spring: M T W R or F 2-5. Classes meet at various college farm facilities. W. F. Miller.

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

ALS 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. Oct. 8, 8:30-10 p.m.; Nov. 5, 8:30-10 p.m.; Nov. 23, 7-8 p.m.; Mar. 4, 8:30-10 p.m.; Apr. 8, 8:30-10 p.m.; Apr. 26, 7-8 p.m. H. A. Geiselmann and S. C. Piliero.

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

ALS 401-402 American and World Community (also Government 401-402) 401, fall; 402, spring. 3 credits each term.

M W 7:30 p.m. One World Room, Anabel Taylor. N. E. Awa, R. A. Baer, H. Feidman, J. C. Mbata, R. J. McNeil, and other professors to be announced.

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 416 Agriculture, Society, and the Environment Spring. 3 credits.

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

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

ALS 695 Environmental Biology Fall and spring. 1-3 credits. Prerequisite: permission of instructor.

Hours to be arranged. D. Pimentel.

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

Agricultural Economics

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

150 Economics of Agricultural Geography Fall. 3 credits.

Lecs, M W F 11:15 or 12:20. Prelims, R 7 p.m., Oct. 8 and Nov. 5. D. G. Sisler.

The economics and geography of world agriculture, providing a basis for understanding past development and future changes. Elementary economic principles, historical development, physical geography, and population growth are studied in their relation to agricultural development and the economic problems of farmers. Where possible, current domestic and foreign agricultural issues are used to illustrate principles.

220 Introduction to Business Management Fall. 3 credits.

Lec, M W F 10:10; disc, M 12:20-2:15, 2:30-4:25, or 7:30-9:25 p.m.; T 8-9:55, 10:10-12:05, 12:20-2:15, or 2:30-4:25; W 8-9:55, 10:10-12:05, 12:20-2:15, or 2:30-4:25. In weeks when disc are

held, there will be no W lecture. Disc are held instead of a lecture in all but four weeks of the term. R. D. Aplin.

Principles and tools useful in performing four major functions of management: planning, organizing, directing and leading, and controlling. Within this framework, consideration is given to social, legal, and economic environments; forms of business ownership; financial statements; cost behavior; and a few key concepts and tools in financial management.

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

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

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

240 Marketing Spring. 3 credits.

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

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

250 Introduction to Energy Resources Spring. 3 credits.

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

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

302 Farm Business Management Spring.

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

Lecs, M W 10:10; disc, F 8, 9:05, 10:10, 11:15, or 12:20; lab, T W or R 1:25-4:25. On days farms are visited, the lab period is 1:25-5:30. One all-day trip and four half-day trips are taken to visit farm businesses. G. J. Conneman.

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, economic principles, 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: Oct. 15 and Nov. 19. D. Blandford.

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

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

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

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

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

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

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

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

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

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

Lecs, M W 2:30-4. J. B. Bugliari, R. S. Smith, D. A. Grossman.

The impact of taxation, both state and federal, on business and personal decision making. After a brief discussion of tax policy and state and local taxes an in-depth examination is conducted of federal income and estate and gift taxes affecting individuals and business entities. Both tax management and tax reporting are stressed.

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

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

An introduction to cost accounting that emphasizes the application of accounting and economic concepts to managerial control and decision making. Major topics include basic costing, standard costing, cost behavior, cost allocation, pricing, budgeting, linear programming, inventory control, transfer pricing, and measuring divisional performance.

324 Financial Management Spring. 3 credits. Prerequisites: Agricultural Economics 220 and Economics 102 or equivalents. Recommended: Agricultural Economics 221 or equivalent.

Lecs, M W F 9:05; disc, W 12:20-2:15 or 2:30-4:25, R 8-9:55 or 12:20-2:15, or F 9:05-11 or 12:20-2:15. In weeks when discussions are held, there will be no F lecture. Discs are held instead of lecture in all but two weeks of the term. Evening prelims: Mar. 9 and Apr. 20.

B. L. Anderson.

Designed to provide knowledge and understanding of business finance. Major topics include capital investment decisions; techniques for handling risk, uncertainty, and inflation in decision making; sources and forms of financing; financial structure; cost of capital; working capital management; and special problems of financial management in the small firm.

332 Economics of the Public Sector Spring. 3 credits. Prerequisite: Economics 102 or equivalent. Lec, M W F 11:15; disc, W 2:30-4 or 7:30-9 p.m., R 12:20-1:50, or F 12:20-1:50. Staff.

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.

340 Economics of Marketing Spring. 3 credits. Prerequisites: Economics 101-102 and Agricultural Economics 240 recommended.

Lecs, M W F 12:20-1:10. L. L. Hall.

This course provides an integrative framework for analysis of marketing functions, activities, and decisions in the food industry. Producer, consumer, and government behavior in the marketing system are explored, and their interaction is discussed. The course focuses on the importance of demand, the industrial organization of the food industry, and the causes and consequences of government intervention.

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

346 Pricing Milk and Dairy Products Spring. 3 credits. Limited to juniors and seniors. Prerequisite: Economics 102.

Lecs, T R 8-9:30. A. Novakovic.

A review of the structural characteristics of the dairy industry and an analysis of the pricing systems for market milk. Particular attention is given to 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 Saturday in September. R. B. How.

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

350 Resource Economics Fall. 3 credits. Prerequisite: either Natural Resources 201 and introductory economics or permission of instructor.

Lecs, T R 10:10; disc, T 1:25-3:20 or W 7:30-9:25.

D. J. Allee, H. E. Conklin.

The application of economic and political science concepts to the use of natural resources, with varying attention to water, land, forests, and fisheries. Considers regional growth, the impact of urban growth, and public decision making in the resources and environmental management area.

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

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

K. L. Robinson.

The course deals broadly with farm and food policies, including price support and storage or reserve policies, international food aid, agricultural protection, 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 covered include sources of capital, financing entry into agriculture, financial analysis of a business, capital management, financial statements, credit instruments, financial risk, leasing, and the forms of business organization.

406 Farm and Rural Real Estate Appraisal Fall. 4 credits. Limited to 45 students. Prerequisites: Agricultural Economics 302 or equivalent and permission of instructor.

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

Intersession (1 week). 1 credit. Prerequisite: Agricultural Economics 302 and 405, 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.

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

M 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 (October only) 1 credit.

Prerequisite: Agricultural Economics 302 and 405.

M 1:25-3:20. R. S. Smith.

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

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

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

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

415 Agricultural Prices Spring. 3 credits. S-U grades optional. Prerequisite: An introductory course in economics, such as Economics 101–102.

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

Lec, F 10:10. W. G. Tomek.

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

420 Advanced Business Law Spring. 3 credits. Limited to upperclass students.

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

J. B. Bugliari.

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

421 Advanced Business Law Spring. 4 credits. Limited to upperclass students. Prerequisite: permission of instructor.

Lecs, T R 8:30–9:55; disc, T 4; one evening prelim.

J. B. Bugliari.

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

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

Lec, T 4. J. B. Bugliari.

Fourteen sessions on the various aspects of estate-planning techniques. The law and use of trusts, the law of wills, federal and New York State estate and gift taxes, and probate procedures are covered.

424 Business Policy Spring. 3 credits. Limited to seniors majoring in business management and marketing.

T R 9:05–10:35, 11:05–12:35, or 2:30–4.

R. D. Aplin.

An integrating course that examines business policy formulation and execution from the standpoint of the general manager of an organization, focusing on decision making at the top management level. The course is built around a series of cases. Emphasizes improving oral and written communication skills.

425 Personal Financial Management Spring. 3 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 covered include financial institutions, investment alternatives, insurance, retail credit, housing, income taxation, and estate planning. Discussions are devoted to problems and case studies in financial planning for students and young families.

426 Management of Cooperative Action Fall. 3 credits.

Lecs, M W F 9:05; disc to be arranged. Evening prelim: Oct. 20. B. L. Anderson.

Investigates the economic role, function, management, and impact of various forms of group action in agriculture. Institutions considered range from informal interest groups to marketing boards. Attention is given to the theory and operation of cooperative organizations. Topics covered include organization, decision making, structure, methods of financing, legal status, tax treatment and market performance.

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: Oct. 29. 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.

M W F 10:10, W 2–4. G. A. German.

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

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

Lecs, T R 10:10–11:25. G. A. German.

Merchandising principles and practices as they apply to food industry situations. The various elements of merchandising are examined, including buying, pricing, advertising, promotion, display, store layout, profit planning and control, and merchandising strategy.

449 Field Study of Marketing Institutions Fall. 2 credits. Prerequisites: Agricultural Economics 342, previous enrollment or concurrent registration or permission of instructor. Field trips will cost approximately \$175.

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. Grades are not registered until February. W. Lesser, B. Anderson.

Incorporates lectures, case problems, and field trips to give students a broad understanding of the institutions and operations involved in distributing and marketing a cross section of agricultural products. Emphasis is on the functions provided by firms in selected agricultural industries, their control and strategic practices and relationships with other firms.

450 Evaluating Resource Investment and

Environmental Quality Spring. 3 credits. Primarily for juniors and seniors. Prerequisite: an introductory

course in economics, a 300-level agricultural economics course, or permission of instructor.

T R 10:10–11:30; disc to be arranged. D. J. Allee. Means of reaching decisions on environmental questions. Concepts of social value and cost-benefit analysis, determination of degrees of importance of environmental problems, environmental impact statements, definitions of environmental quality, and questions of political economy.

452 Agricultural Land Policy Spring. 3 credits.

Lec, F 8–9:55; disc, F 1:25–3:25; field trips to be arranged. H. E. Conklin.

Recent changes in the laws, programs, and policies at state and local levels that affect the use of farmland in the northeastern United States.

464 Economics of Agricultural Development

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

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

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

499 Undergraduate Research Fall or spring.

1–4 credits. Limited to seniors with grade point averages of at least 2.7. Prerequisite: written permission of the staff member who will supervise the work and assign the grade; this permission must be attached to course enrollment material. S-U grades optional.

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

540 Marketing Research Spring. 2 credits.

Prerequisite: permission of instructor.

Lec, R 12:20–2:15. M. E. Brunk.

Objectives of marketing research, organization and management of research and research agencies, problem identification, selecting and planning projects, and design and use of research by management.

608 Production Economics Fall. 3 credits.

Prerequisite: Economics 311 or equivalent.

Recommended: Mathematics 108 or 111 or equivalent.

Lecs, M W F 12:20. L. W. Tauer.

A comprehensive survey of the theory of production economics with emphasis on applications to agriculture and agribusiness. Topics include the derivation, estimation, and use of production, cost, and supply functions.

650 Economic Analysis of Public Policy Spring. 4 credits. Primarily for graduate students but open to seniors. Prerequisite: Economics 509, or permission of instructor.

T R 9:05–11. R. J. Kalter.

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

651 Economics of Resource Use Fall. 4 credits.

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

An introduction to recent literature in theory and applied analysis. Dynamic optimization and resource use, externality theory and its application to

environmental economics, pricing and taxation, and resource use, income, and employment. 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, H. E. Conklin. 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.

664 Microeconomic Issues in Agricultural Development Spring. 3 credits. Prerequisite: Agricultural Economics 608, Economics 311, or permission of instructor.

T R 11–12:30. 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 permission of instructor.

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. 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 Special Topics in Agricultural Economics Fall or spring. Credit to be arranged. Limited to graduate students.

Hours to be arranged. Staff. A group discussion of areas of special interest in the field of agricultural economics. Students are required to review literature and present oral or written reports or both.

708 Advanced Production Economics Fall. 3 credits. Prerequisites: Agricultural Economics 608, 710, or equivalents.

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 starting with least squares estimation of the linear regression model and continuing with other standard topics. About four weeks are devoted to simultaneous-equations methods. The course is taught at an intermediate level, using matrix algebra, with emphasis on empirical research and is intended mainly for Ph.D. students who plan to become professional economists.

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

Lecs, T R 2:30–4:25. T. D. Mount. Coverage beyond that of Agricultural Economics 710 of generalized least squares, models with stochastic regressors, testing linear hypotheses, and the effects of specification errors. Applications include seemingly unrelated regressions, three-stage least squares, estimation with pooled data, models with stochastic coefficients, and distributed lag models. Other topics covered are principal components, factor analysis, and probit and logit analysis, with extensions to deal with multinomial problems.

712 Quantitative Methods I Fall. 4 credits. Prerequisite: Statistics 416 or equivalent. Statistics 417 suggested.

Lecs, M W F 11:15. Evening exam: Oct. 27. R. N. Boisvert. A comprehensive treatment of linear programming and its extensions, including postoptimality analysis and the transportation model. Special topics in integer and nonlinear programming, including spatial equilibrium and risk programming models. Input-output models are treated in detail. Applications are made to agricultural, resource, and regional economic problems.

713 Quantitative Methods II Spring. 4 credits. Prerequisite: Agricultural Economics 712 or permission of instructor.

Lecs, M W F 9:05–9:55; disc, F 12:20–2:15. R. A. Milligan. A study of quantitative techniques used to solve dynamic problems. The first half of the course is concerned with simulation; the second, with dynamic optimization.

714 Quantitative Models and Applications Spring. 3 credits. Prerequisite: command of quantitative tools as offered in Agricultural Economics 710–713.

Lec to be arranged. T. D. Mount and staff. The course covers such topics as model specification, simulation, and forecasting applications. Recent developments in model evaluation and computing are considered. Empirical studies in agricultural and resource economics provide a basis for discussion.

717 Research Methods in Agricultural Economics Spring. 2 credits. Limited to graduate students.

M 1:25–3:20. B. F. Stanton and 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 which may be associated with their thesis.

[730 Seminar on Agricultural Trade Policy] Spring. 3 credits. Limited to graduate students. Prerequisites: Agricultural Economics 430 and basic familiarity with quantitative methods. Offered alternate years. Not offered 1981–82.

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.]

731 Seminar on Methods of Trade and Commodity Policy Analysis Spring. 3 credits. Limited to graduate students. Prerequisites: basic training in quantitative methods (Agricultural Economics 710 and 712 or equivalent) and permission of instructor. Offered alternate years.

F 1:25–4. D. Blandford. A discussion of the structure, use, and usefulness of alternative quantitative methods of commodity policy analysis. Preparing a term paper is an important part of the course.

742 Agricultural Markets and Public Policy Spring. 3 credits. Limited to graduate students. Prerequisite: familiarity with multiple regression techniques on the level of Statistics and Biometry 601.

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, coordination systems in agriculture and cooperative theory and performance. An application of these techniques to analyzing marketing problems in developing economies is also presented.

743 Export Marketing Fall. 3 credits. Limited to graduate students. Estimated cost of field trip, \$85. Lec, R 2:30–4:25. Overnight field trip to New York City required. M. E. Brunk.

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.

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

T R 2:30–4:25. J. M. Conrad. This course focuses on recent developments in mathematical bioeconomics as they relate to the management of renewable resources. The theory and methods of dynamic optimization are briefly reviewed. Theory and applied studies in fishery, forestry, and water resource economics are examined, along with the role and effectiveness of alternative public policies.

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

W 1:25–3:20. K. L. Robinson. A review of the professional literature relating to agricultural policy issues, and techniques appropriate to the analysis of such issues.

752 Readings in Philosophy Spring. 3 credits. Limited to Ph.D. degree candidates.

S 9:05–12. H. E. Conklin. Readings, selected for their relevance to research in agricultural economics, are chosen from among books such as *Structure of Scientific Revolutions*, *The Theory of Experimental Inference*, *The Nerves of Government*, *Economics as a Science*, and *A Theory of Economic History*.

Related Courses in Other Departments**Statistics II (I&LR 311)****Introduction to Computer Uses in Data Analysis (Agricultural Engineering 304)****Matrix Algebra I (Statistics and Biometry 416)****Matrix Algebra II (Statistics and Biometry 417)****Agricultural Engineering**

N. R. Scott, chairman; L. D. Albright, J. A. Bartsch, R. D. Black, J. K. Campbell, J. R. Cooke, R. B. Furry, R. W. Guest, W. W. Gunkel, D. A. Haith, W. W. Irish, L. H. Inwin, W. J. Jewell, F. G. Lechner, G. Levine, R. C. Loehr, H. A. Longhouse, R. T. Lorenzen, D. C. Ludington, E. D. Markwardt, W. F. Millier, R. A. Parsons, R. E. Pitt, G. E. Rehkgugler, J. W. Spencer, T. S. Steenhuis, L. P. Walker, M. F. Walter

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

131 Elements of House Design Spring. 3 credits. See D&EA 120, Residential Technology.

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

Lec, T 9:05; labs, T W or R 1:25–4:25. F. G. Lechner.

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

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

Lec, T 1:25; lab, F 1:25–3:20. G. E. Rehkgugler. An introduction to digital computing using the PL/C language through the use of computing problems in agricultural engineering subjects and related areas such as environmental technology and agriculture.

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

Lec, T 1:25; lab, F 1:25–3:20. R. B. Furry. An introduction to digital computing using the FORTRAN language. Applications to engineering graphics.

153 Engineering Drawing Fall. 2 credits. Limited to 72 students (36 in each lab).

Lecs, M 9:05; lab, M or T 1:25–4:25. H. A. Longhouse.

Designed to promote an understanding of the engineer's universal graphic language. The lectures and laboratories develop working knowledge of drawing conventions, drafting techniques, and their application to machine and pictorial drawing problems. Introduction to descriptive geometry and use of interactive computer graphics is included.

200 Undergraduate Seminar Spring. 1 credit.

Lec, M 2:30. N. R. Scott.

A forum to discuss the contemporary and future role of agricultural engineering in society. A series of lectures will be given by practicing agricultural engineers, Cornell faculty members, and students. Written critiques are required. Students may take the seminar more than once but are limited to 2 credits maximum.

201 Introduction to Energy Technology Spring. 3 credits. Prerequisite: high school or college physics.

Lec, M W F 10:10. L. D. Albright.

Basic concepts of energy and traditional and alternate sources of energy. The energy transfer process is investigated. Topics include heating, cooling, solar radiation, electricity, hydropower, refrigeration, wind power, geothermal energy, biogas production, and energy economics.

208 Application of Physical Sciences I Fall.

3 credits. Prerequisite: a term of calculus and high school physics or a year of college physics.

Lec, T R 8–9:55; rec, W 8 or 9:05. D. C. Ludington. The application of statics, dynamics, mechanics of materials, and fluid mechanics to physical problems in agriculture. Topics include torque, free-body diagrams, friction, energy, stress, bending, shear, fluid flow, and wall pressures. Emphasis is on problem solving.

209 Application of Physical Sciences II Spring.

3 credits. Prerequisite: Agricultural Engineering 208. Lec, T R 8:20–9:55; rec, W 8 or 9:05.

D. C. Ludington. A continuation of Agricultural Engineering 208. The laws of thermodynamics and principles of energy transfer, psychrometrics, and electricity are covered. Topics include applications in agriculture of the various gas and vapor cycles used in engines and refrigeration, heat conduction through multiple layers, convection, solar radiation, lighting principles, behavior of air and water vapor mixtures, and basic electricity. Solving practical problems is emphasized.

221 Plane Surveying Fall. 3 credits. Limited to 90 students (30 per lab). S-U grades optional.

Lecs, T R 11:15; lab, M T or W 1:25–4:25. Staff. An introduction to plane surveying. The use and care of equipment is stressed during field problems related to construction and mapping.

250 Engineering Applications in Biological Systems Spring. 3 credits. Prerequisite:

coregistration in Mathematics 294; thermodynamics suggested or permission of instructor. Recommended for the sophomore year.

Lec, M W F 12:20. R. E. Pitt.

Case studies of engineering problems in agricultural and biological systems including animal and crop production, environmental control, energy, and food engineering. Emphasis is on the application of mathematics, physics, the engineering sciences and biology to energy and mass balances in agricultural systems.

304 Introduction to Computer Uses in Data Analysis Spring. 3 credits. Each lab limited to 36 students. Prerequisite: one course in college mathematics or statistics or permission of instructor.

S-U grades optional. Lec, T R 11:15; lab, M T W R or F 1:25–2:15.

Prelims: 9 p.m. Mar. 4 and April 15. R. B. Furry.

An introductory course in computing for those interested in using digital computers to handle data. Topics include description and preparation of data, preparing and processing computer programs, computer attributes and applications, computer library programs, and related computing facilities. No prior knowledge of computers or computing languages is necessary.

305 Principles of Navigation Fall. 4 credits.

3 lec, disc, and project period at hours to be arranged. R. D. Black.

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 Fall or spring. 1 credit (2-credit option in spring). Prerequisite: Agricultural Engineering 110 or permission of instructor.

Fall: lab, F 1:25–4. Spring: lab W 1:25–4; (second lab must be arranged for 2-credit option).

F. G. Lechner.

Fall: advanced machine shop. Spring: advanced welding and metal construction project.

311 Farm Machinery Fall. 3 credits. Not open to freshmen. Each lab limited to 16 students.

Prerequisite: high school physics or equivalent.

Lec, T R 10:10; rec-lab, T W or R 1:25–4:25.

W. F. Millier.

A study of the operating principles, use, selection, and methods of estimating costs of owning and operating farm machines. Lab work includes practice in the calibration of planting, fertilizing, and pesticide application machinery and study of the functional characteristics of agricultural machines and machine components.

312 Internal Combustion Engines for Agriculture Spring. 3 credits. Each lab limited to 16 students. Prerequisite: high school physics or equivalent.

Lec, T R 11:15; lab, T W or R 1:25–4:25.

W. F. Millier.

A study of the principles of operation, adjustment, and maintenance of hydrocarbon-fueled single cylinder and multicylinder internal combustion engines. Topics include engine cycles, fuels, lubricants, carburetion, fuel injection systems, ignition, charging circuits, valve reconconditioning, and engine testing.

315 Electricity on the Farm 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 of electricity for light, heat, and power on farms, with emphasis on the principles of the operation, selection, and installation of electrical equipment for the farmstead.

321 Soil and Water Conservation Spring.

2 credits. Must be taken with Agronomy 321. S-U grades optional.

Lec, F 8; disc-lab, M or T 1:25–4:25 (additional labs offered if enrollment requires it). R. D. Black.

A study of the principles and practices used in the solution of soil and water conservation problems. Both farm and nonfarm problems are explored. Engineering aspects of erosion control, water management, water storage, and drainage are examined.

331 Farmstead Production Systems Fall.

3 credits. S-U grades optional.

M W F 8. R. T. Lorenzen.

A study of layout, material handling, and environment associated with agricultural production on the farmstead. Planning and design techniques pertaining to biointrinsic and integrated systems are emphasized.

332 Farm Buildings Design Fall. 2 credits.

Prerequisite: concurrent or previous registration in Agricultural Engineering 331. Intended for students without backgrounds in statics or properties of structural materials.

Lec-lab, R 1:25–4:25. R. T. Lorenzen.

Structural design of buildings used for farmstead production systems. Wood is emphasized as a structural material.

371 Water and Chemical Movement in the Landscape Spring. 3 credits. Prerequisites:

Agronomy 200 or equivalent or permission of instructor.

Lec, T R 9:05; lab-lec, W 1:25–4:25. T. S. Steenhuis and R. E. Muck.

The hydrologic cycle, major chemical cycles, and their interactions with the land will be the basis of this

course. Within this framework, the movement of any chemical (nutrient, pesticide, heavy metal) through the environment along with its implications with regard to land disposal of wastes and agricultural production is discussed. Emphasizes basic understanding and the probabilistic nature of the processes involved, but some problem solving is done.

401 Career Development in Agricultural Engineering Fall. 1 credit. Limited to seniors. S-U grades only.

Lec, T 12:20. W. W. Gunkel.
A presentation and discussion of the opportunities and qualifications for and responsibilities of positions of service in the various fields of agricultural engineering.

414 Power Transmission Systems Spring. 2 credits. Limited to 16 students. Prerequisite: Agricultural Engineering 312.

Lec, W 10:10; lab, F 10:10–1:10. W. F. Millier.
A study of the principles and operation of hydraulic and mechanical power transmission systems used in agricultural tractors and equipment. Hydraulic power transmission includes system components, circuit diagrams, hydrostatic transmissions, and system analysis. Mechanical power transmission includes clutches, brakes, parallel shaft and planetary transmissions, traction, and drawbar horsepower.

461 Agricultural Machinery Design Fall. 3 credits.

Prerequisite: mechanical design or equivalent.
Lec, T R 10:10; lab, F 1:25–4:25. W. W. Gunkel.
The principles of design and development of agricultural machines to meet functional requirements. Emphasis is given to computer-aided analysis and design, stress analysis, selection of construction materials, and testing procedures. Engineering creativity and agricultural machine systems are also stressed.

462 Agricultural Power Spring. 3 credits.

Prerequisite: dynamics and thermodynamics or equivalent.
Lec, T R 10:10; lab, F 1:25–4:25. W. W. Gunkel.
Use of energy in agriculture. Emphasis is given to basic theory and analysis and testing of internal combustion engines and suitable components for use in farm tractors and other power applications. Soil mechanics related to traction and vehicle mobility; economics and human factors in design are considered.

465 Processing and Handling Systems for Agricultural Materials Fall. 3 credits. Prerequisite: Agricultural Engineering 250.

Lec, T R 11:15; lab, W 2:30–4:25. R. B. Furry.
Drying, fluid flow measurement, and material handling applications, with an introduction to dimensional analysis and controls for agricultural engineering applications. Problem solutions employ both analog and digital computers.

466 Engineering Design and Analysis of Food Processing Equipment Fall. 3 credits.

Prerequisite: Food Science 302, its equivalent, or concurrent enrollment in an engineering curriculum.
T R 9:05, R 1:25–4:25. G. E. Rehkugler.
The analysis and design of food-processing equipment from the point of view of selecting and designing equipment appropriate for transporting or modifying a food product.

471 Soil and Water Engineering Fall. 3 credits. Prerequisite: fluids or permission of instructor.

Lec, T R 9:05; lab, R 2:30–4:25. M. F. Walter.
The application of engineering principles to problems of soil and water management. Analysis and design of water management systems including hydrology, hydraulic structures, wells, channels, small reservoirs, and sediment control.

475 Introduction to 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, et cetera.

481 Agricultural Structures Design Spring.

3 credits. Prerequisite: Engineering CEE G301.
Lec, T R 1:25; disc-lab, R 2:30–4:40.
R. T. Lorenzen.
Application of basic structural concepts to design of agricultural structures. Emphasizes wood structures, including design of trusses, rigid frames, prefabricated panels, and columns.

482 Environmental Control for Animals and Plants Spring. 3 credits. Prerequisite: Agricultural Engineering 250 and thermodynamics.

Lec, M W 11:15; lab, M 1:25–4:25. L. D. Albright.
Thermal interchanges between animals (including humans) and plants and the environment. Physiological principles affecting thermal comfort and health. Ventilation, thermal modeling, psychrometrics, solar energy, and weather phenomena.

491 Highway Engineering Fall. 3 credits.

Prerequisite: Engineering CEE D301 or permission of instructor.
Lec, W F 12:20; lab, M 12:20–3:20. L. H. Irwin.
Highway systems, planning, economy analysis, road location and geometric design, traffic engineering, drainage design, and soil engineering. Introduction to highway materials, pavement design, and highway maintenance.

492 Bituminous Materials and Pavement Design

Spring. 3 credits. Prerequisite: concurrent registration in Engineering CEE D301 or permission of instructor.
Lec, W F 12:20; lab, M 12:20–3:20. L. H. Irwin.
Properties of asphalts, aggregates, and bituminous mixtures; bituminous mixture design. Seal coat and surface treatment design. Soil stabilization methods. Flexible pavement design methods, rigid pavement design methods, pavement design for frost conditions.

497 Special Problems in Agricultural Engineering Fall or spring. 1 credit.

Normally reserved for seniors in upper two-fifths of their class. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work and assign the grade. Prerequisite: adequate ability and training for the work proposed.
Staff.
Special work in any area of agricultural engineering on problems under investigation by the department or of special interest to the student, provided, in the latter case, that adequate facilities can be obtained.

501–502 M.P.S. Project Fall and spring.

1–6 credits. Required of each M.P.S. candidate in the field.
Hours to be arranged. Staff.
A comprehensive project emphasizing the application of agricultural technology to the solution of a real problem.

551–552 Agricultural Engineering Design

Project Fall and spring. 6 credits. Prerequisite: admission to the M.Eng.(Agr.) degree program or equivalent preparation.
Hours to be arranged. L. D. Albright and staff.
Comprehensive design projects dealing with existing engineering problems in the field. Emphasis is on the formulation of alternative design proposals that include consideration of economics, nontechnical factors, engineering analysis, and complete design for the best design solution.

652 Instrumentation Spring. 3 credits.

Prerequisite: electrical systems or permission of instructor.
Lecs, T R 12:20; lab to be arranged. N. R. Scott.
The application of instrumentation concepts and systems to physical and biological measurements. Characteristics of instruments, signal conditioning and interfacing, shielding and grounding, transducers, data acquisition systems, microprocessors, microcomputers, and radiotelemetry are considered.

672 Drainage Engineering Spring. 4 credits.

Prerequisite: Agricultural Engineering 471 or permission of instructor. Offered alternate years.
Lecs, M W F 10:10; lab, F 1:25–4:25.
T. S. Steenhuis, R. D. Black.
Analysis and design of surface, subsurface, and combined drainage systems, with emphasis on agricultural applications. The elements of surface, channel, and porous media flow are analyzed, as well as entire systems of collectors, storages, pumps, and methods of overflow protection for large areas. Effect of drainage on water quality is reviewed.

[673 Irrigation Engineering] Spring. 3 or 4 credits.

Prerequisites: Agronomy 200 and Agricultural Engineering 471 or permission of instructor. Offered alternate years. Not offered 1981–82.
Lecs, M W F 10:10; lab, F 1:25–4:25. R. D. Black and T. S. Steenhuis.
Analysis and design of irrigation systems. Soil-plant-water relationships, water quality, water supplies, water delivery systems, and water distribution systems are analyzed.]

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 Water Quality Models

Spring. 1–3 credits. Limited to upperclass or graduate students. Prerequisites: computer programming, a year of calculus, and permission of instructor. S-U grades optional.
Lecs, M W F 9:05. D. A. Haith.
Mathematical models for analysis of agricultural and urban nonpoint sources. Three 1-credit sequential units: (1) stormwater models—computer models of runoff and moisture balances; (2) basic nonpoint source models—simple models for urban and agricultural runoff, land application of wastes; (3) agricultural simulation models—pesticides, nutrients, and salinity.

679 Use of Land for Waste Treatment and

Disposal Spring. 3 credits. Prerequisite: permission of instructor.
Lecs, T R 3:35–4:50. W. J. Jewell.
Covers the social, legal, and technical factors, the properties of land and crop systems that make land application of wastes a viable alternative, and the use of fundamentals in the development of regulations and the design of full-scale units.

685 Biological Engineering Analysis Fall.

4 credits. Prerequisite: Engineering T&AM 310 or permission of instructor.
M W F 12:20. R. E. Pitt.
Engineering problem-solving strategies and techniques are explored. Students solve several representative engineering problems that inherently involve biological properties. Emphasis is on the formulation and solution of mathematical models and the interpretation of results. The student's knowledge of fundamental principles is used extensively.

700 General Seminar Fall. Noncredit.
M 12:20. N. R. Scott.

Presentation and discussion of research and special developments in agricultural engineering and related fields.

701 Special Topics in Agricultural Engineering
Fall or spring. 1–6 credits. Prerequisite: permission of instructor. S-U grades optional.

Hours to be arranged. Staff.
Topics are arranged by the staff at the beginning of the term.

750 Orientation for Research Fall. 1 credit.
Limited to newly joining graduate students. S-U grades only.

Lecs, first 5 weeks, M 3:20; remainder, M R.
G. E. Rehkugler.
An introduction to departmental research policy, programs, methodology, resources, and degree candidates' responsibilities and opportunities.

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. Not offered 1981–82.

Hours to be arranged. Staff.
Management of agricultural wastes, with emphasis on physical, chemical, biological, and economic factors affecting waste production, treatment and handling, utilization, and disposal.]

781 Agricultural Structures and Related Topics Seminar Spring. 1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only.

Disc to be arranged. L. D. Albright.
Consideration of farmstead production systems, with emphasis on biological, economic, environmental, and structural requirements.

785 Biological Engineering Seminar Spring.
1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only.

Disc to be arranged. N. R. Scott, J. R. Cooke.
The interaction 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, W. H. Allaway, A. A. App, D. R. Bouldin, B. E. Dethier, W. B. Duke, J. M. Duxbury, G. W. Fick, D. L. Grunes, W. K. Kennedy, W. R. Knapp, W. W. Knapp, J. Kubota, 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. Pevery, W. S. Reid, S. J. Riha, T. W. Scott, R. R. Seane, T. L. Setter, P. L. Steponkus, F. N. Swader, A. Van Wambeke, R. M. Welch, M. J. Wright, R. W. Zobel

Atmospheric Sciences

101 Basic Principles of Meteorology Fall.
3 credits. Limited to 140 students.

Lecs, T R 11:15; lab, M T W or R 1:25–4:25.

B. E. Dethier.

A simplified treatment of the structure of the atmosphere: heat balance of the earth; general and secondary circulations; air masses, fronts, and cyclones; hurricanes, thunderstorms, tornadoes, and atmospheric condensation. In the laboratory, emphasis is on techniques of analysis of weather systems.

103 Basic Principles of Meteorology, Laboratory
Fall. 1 credit. Prerequisite: an introductory course in meteorology without a lab.

M T W R 1:25–4:25. B. E. Dethier.
Techniques of analysis of weather systems and the application of dynamical and empirical methods of predicting the daily atmospheric circulation.

314 Agricultural Meteorology Fall or spring.
3 credits. Limited to 35 students.

T R 10–11:25. A. B. Pack.
An introduction to the relationships of radiant energy, temperature, wind, and moisture in the atmosphere near the ground. The interplay between physical processes of the atmosphere, plant canopies, and soil is examined. Moisture relationships in the atmosphere-soil-plant continuum, the effects of environmental modification, and the bioclimatic requirements of plants are also discussed.

325–326–327–328 Meteorological Communications 325 and 327, fall; 326 and 328, spring. 1 credit each semester. Primarily for undergraduate meteorology majors. S-U grades optional.

Hours to be arranged. Staff.
The student becomes acquainted with facsimile, teletype, and satellite receiving equipment and the data products used in weather forecasting.

411–412 Theoretical Meteorology I and II Fall and spring. 3 credits each semester. Prerequisites: a year each of calculus and physics.

M W F 10:10. W. W. Knapp.
Fall semester topics include meteorological coordinate systems; variation of wind and pressure fields in the vertical; winds in the planetary boundary layer; surfaces of discontinuity; mechanisms of pressure change; vorticity and circulation. Topics considered in the spring term include thermodynamics of dry air, water vapor, and moist air; hydrostatics and stability.

[417 Physical Meteorology] Fall. 3 credits.
Prerequisite: a year each of calculus and physics. Offered alternate years. Not offered 1981–82.

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.]

430 Synoptic Meteorology I Fall. 4 credits.
Prerequisites: either Atmospheric Sciences 411 and 412 or permission of instructor.

Lecs, M R 1:25; lab, R 2:30–4:25. D. A. Paine.
The application of quasi-geostrophic theory as a diagnostic and forecast method, including the use of minicomputer products derived from the barotropic, baroclinic, and primitive equation numerical models. Lab work includes surface and upper air analyses and thickness and vorticity computations using radiosonde data documenting macroscale cyclogenesis.

432 Synoptic Meteorology II Spring. 4 credits.
Prerequisite: Atmospheric Sciences 430 or permission of instructor.

Lecs, T F 1:25; lab, T 2:30–4:25. D. A. Paine.
The conservation laws for mass, energy, and momentum in constant entropy coordinates. Derivation and construction of adiabatic versus diabatic trajectories. Ertel's potential vorticity theorem

evaluated by the quasi-Lagrangian trajectory technique. The laboratory employs the Atmospheric Sciences 430 storm data to contrast constant pressure and isentropic methods of analysis.

464 Biometeorology Spring. 2 credits.
Prerequisite: with permission of the instructor (no course prerequisites).

Lec, W 1:25; lab, W 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 CO₂ increase. Empirical and theoretical models of such interactivity is presented. A systems-level approach to environmental protection decisions is emphasized.

499 Undergraduate Research in Meteorology
Fall and spring. 1–3 credits.

Staff.
Required of honor students in the physical sciences majoring in meteorology.

650 Special Topics in Meteorology and Climatology Fall or spring. 1 or more credits.
Staff.

A study of meteorological topics more advanced than or different from those in other courses. Subjects depend on the background and desires of those enrolled.

691 Seminar in Meteorology Fall or spring.
Prerequisite: permission of instructor.

Hours to be announced. B. E. Dethier.
Subjects such as weather modification, paleoclimatology, and atmospheric pollution.

962 Research in Meteorology Fall or spring. 1 or more credits.
Staff.

Thesis research.

Crop Science

311 Grain Crops Fall. 4 credits. Prerequisite: Agronomy 200 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 200 or Biological Sciences 241. Recommended: Animal Science 112.

Lecs, M W F 11:15; lab, M T or W 1:24–4:25. One field trip during a lab period (until 5 p.m.) or on a weekend. G. W. Fick.

The production and management of crops used for livestock feed are considered in terms of establishment, growth, maintenance, harvesting, and preservation. Forage grasses, forage legumes, and corn are emphasized, and consideration is given to their value as livestock feed in terms of energy, protein, and other nutritional components.

314 Production of Tropical Crops Spring.
3 credits. Prerequisite: a course in crop production.

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 200, 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 pesticide problem solving.

317 Seed Science and Technology Fall. 3 credits. Prerequisite: Biological Sciences 241 or equivalent. Offered alternate years.

Lecs, T R 11:15; lab, R 1:25–4:25. Geneva staff (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.

371 Undergraduate Research in Crop Science 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.

610 Physiology of Environmental Stresses Spring. Prerequisite: Biological Sciences 242 or 341. 3 credits. Offered alternate years.

Lecs, T R 10:10. P. L. Steponkus.
A study of the responses of plants to environmental stresses, including chilling, freezing, high temperature, and drought. Emphasis is on the physiological and biochemical basis of injury and plant resistance mechanisms at the whole-plant, cellular, and molecular levels.

611 Crop Simulation Modeling Fall. 3 credits. Prerequisite: Biological Sciences 242 or 341. Recommended: computer programming experience. Offered alternate years.

M W F 11:15. G. W. Fick.
A study of existing crop models is followed by development and refinement of programs representing the students' work. The computer language CSMP is used. Emphasis is on quantitative formulation and testing of complex hypotheses related to crop growth. Carbon exchange, transpiration, microclimate, soil water supply, root functions, and dry-matter distribution in growing crops are covered.

612 Grain Formation Spring. 3 credits. Prerequisite: plant physiology.

M W F 12:20. R. L. Obendorf.
Morphology, physiology, and biochemistry of cereal, legume, and oil-seed formation, composition, storage, and germination. Emphasis is on the deposition of seed reserves during seed formation, stabilization of reserves during storage, and mobilization of reserves during germination. Coverage ranges from practical, "on-farm" problems to molecular biology.

613 Ecology and Physiology Yield Fall. 3 credits. Prerequisites: Biological Sciences 242.

M W F 8. T. L. Setter.
A study of the constraints on crop productivity from a physiological perspective. Influence of environment and genetics on the assimilation, translocation, and partitioning of carbon and nitrogen during crop ontogeny. Emphasis on growth processes of vegetative plant organs.

651 Special Topics In Crop Science 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 topic is arranged at the beginning of the term for individual study or for group discussions.

761 Graduate Research in Crop Science Fall, spring, or summer. Credit by arrangement. Limited to members of the graduate field.
Hours to be arranged.

790 Agronomy Seminar Noncredit. See course description in soil science section below.

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)

Soil Science

200 Nature and Properties of Soils Fall or spring. 4 credits. Prerequisite: Chemistry 103, 207, or 215. S-U grades optional.

Lecs, M W F 9:05; lab, M T W or R 1:25–4:25. Fall, D. J. Lathwell; spring, T. W. Scott.
A comprehensive introduction to the field of soil science, with emphasis on scientific principles and their application in solutions of practical soil management problems.

301 Identification, Appraisal, and Geography of Soils Fall. 4 credits. Prerequisite: Agronomy 200 or permission of instructor. S-U grades optional.

Lec, M W F 10:10; lab, W 2–4:25; field trips. Staff.
The soil as a natural body. Principles of identification and classification of geographic units of soil and interpretation of such units for applied objectives. Geography of major kinds of soil of North America in relation to environment and cultural patterns. Laboratory exercises and field trips to assist in identifying and interpreting soils.

302 Field Identification of Soils Fall. 1 credit. Prerequisite: Agronomy 200.

R 1:25–4:25. Staff.
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.

321 Soil and Water Conservation Spring. 2 credits. Prerequisites: Agronomy 200 and concurrent registration in Agricultural Engineering 321. S-U grades optional.

M W 8. W. H. Allaway.
A study of the principles and practices used in soil and water conservation, agronomic aspects of erosion control, water management, storage, drainage, and irrigation.

324 Soil Fertility Management Fall. 3 credits. Prerequisite: Agronomy 200 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.

331 Aquatic Plant Management Fall. 3 credits. Prerequisites: Biological Sciences 101–102 and Chemistry 103–104 or equivalents.

T R 11:15; T 1:25–4:25. J. H. Peverly.
The chemistry and physiology of higher aquatic plants are studied, from the inorganic solid, solution, and gaseous phases of the environment to cellular and subcellular levels of plants. Application of the basic physical and chemical concepts, presented to predict effects on aquatic plant growth, are illustrated in lab and field situations.

401 Geography and Appraisal of Soils of the Tropics Spring. 3 credits. Prerequisite: Agronomy 200 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.

[403 Organic Soils Fall. 2 credits. Prerequisite: Agronomy 200. Offered alternate years. Not offered 1981–82.

W 1:25–4:25; some field trips will not return before 5:30. J. M. Duxbury.
A combination of field study and discussion of the genesis, ecology, physical and chemical properties, agricultural uses, and management of organic soils.]

404 Forest Soils Fall. 3 credits. Prerequisite: Agronomy 200 or permission of instructor.

Lecs, T R 8; lab, M or T 1:25–4:25. Some field trips may not return before 5:30. S. J. Riha.
Ecology of forest soils. Application of basic physical and chemical principles to the study of energy, water, and nutrient budgets of forest ecosystems. Implications for forest management.

406 Soil Microbiology, Lectures Spring. 3 credits. Prerequisite: Agronomy 200 or Microbiology 290. Offered alternate years.

M W F 10:10. M. Alexander.
A study of the major groups of soil microorganisms, their ecological interrelationships, and the biochemical functions of soil organisms.

[410 Microbial Ecology Spring. 3 credits. Prerequisite: an elementary course in some facet of microbiology. Offered alternate years. Not offered 1981–82.

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 Management Systems for Tropical Soils Spring. 3 credits. Prerequisite: Agronomy 401 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1981–82.

Lec, W F 8; disc, W 2:30–4:25. A. Van Wambeke.
Land evaluation in tropical areas; water requirements in semiarid tropics. Management of tropical soils in relation with nitrogen, acidity, liming, phosphorus, and other nutrients. Effects of cropping systems on soils, soil conservation methods, and erosion control.]

497 Special Topics In Soil Science 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.

499 Undergraduate Research in Soil Science

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 soil science.

506 Use of Soil Information and Maps as Resource Inventories Fall. 2 credits. S-U grades optional. For anyone interested in using soils. Offered alternate years.

T R 11:15. G. W. Olson.
Principles, practices, and research techniques in interpreting soil information and maps for planning, developing, and using areas of land.

602 Chemical Methods of Soil Analysis Spring. 3 credits. Prerequisites: Agronomy 200 and Chemistry 207-208 or equivalents.

T R 1:25-3:30. M. B. McBride.
Lectures and laboratory exercises present the fundamental concepts and analytical methods of soil chemistry.

603 Morphology, Genesis, and Classification of Soils Spring. 3 credits. Prerequisite: Agronomy 301 or permission of instructor. Offered alternate years.

T R 10:30-12. Staff.
Principles of soil classification, reactions, and processes of soil genesis, soil taxonomy, and development and significance of major groups of soils of the world.

606 Advanced Soil Microbiology Fall. 1 credit. Prerequisite: Agronomy 406 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.

[607 Soil Physics] Fall. 3 credits. Prerequisites: Agronomy 200 and a year of college physics or permission of instructor. Offered alternate years. Not offered 1981-82.

M W F 11:15. R. D. Miller.
A study of physical properties and processes in soils, with emphasis on basic principles.]

[608 Water Status in Plants and Soils] Fall. 2 credits. Prerequisite: permission of instructor. S-U grades optional. Offered alternate years. Not offered 1981-82.

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.]

609 Soil Organic Matter Fall. 2 credits. Prerequisites: Agronomy 200 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.

701 Soil Chemistry and Mineralogy Fall. 3 credits. Prerequisites: Agronomy 200 and a year of physical chemistry, or permission of instructor. Offered alternate years.

T R 10:10-11:25. 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.

[724 Soil Fertility Advanced Course] Spring. 3 credits. Prerequisite: graduate status with a major or minor in agronomy. Offered alternate years. Not offered 1981-82.

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.]

760 Graduate Research in Soil Science Fall or spring. Credit by arrangement. Limited to students in the graduate field.

Hours by arrangement.
790 Agronomy Seminar Fall or spring. Noncredit. Required of graduate students majoring or minoring in the department.

T 4.
Related Course in Another Department

Special Studies of Problems of Agriculture in the Tropics (International Agricultural Development 602)

Animal Sciences

Department of Animal Science: R. J. Young, chairman; H. R. Ainslie, B. J. Appar, D. E. Bauman, D. H. Beermann, R. D. Boyd, W. R. Butler, L. E. Chase, W. B. Currie, T. R. Dockerty, J. M. Elliot, R. W. Everett, H. N. Erb, R. H. Foote, D. G. Fox, J. A. Fitzgerald, D. M. Galton, R. C. Gorewit, W. Hansel, H. F. Hintz, D. E. Hogue, R. E. McDowell, W. G. Merrill, E. A. Oltenacu, P. A. Oltenacu, R. L. Quaas, J. B. Russell, S. W. Sabin, H. F. Schryver, R. D. Smith, C. J. Sniffen, J. R. Stouffer, M. L. Thonney, D. R. Van Campen, N. L. VanDemark, P. J. Van Soest, L. D. VanVleck, R. G. Warner

Department of Poultry and Avian Science: R. C. Baker, chairman; R. E. Austic, S. E. Bloom, G. F. Combs, Jr., D. L. Cunningham, R. R. Dietert, H. G. Ketola, C. C. McCormick, J. A. Marsh, C. E. Ostrander, J. M. Regenstein, E. A. Schano, A. van Tienhoven

100 Introductory Animal Science Fall. 3 credits. For beginning students. S-U grades optional.

Lecs, W F 10:10; lab, T R or F 2-4:25. J. M. Elliot.
An introduction to animal science dealing with domestic animals and with current practices and problems of the livestock and meat industries. The place of the physical and biological sciences in animal agriculture is discussed. Emphasis is on the nutrition, physiology, breeding, and management of dairy cattle, beef cattle, sheep, swine, and horses.

105 Contemporary Perspectives of Animal Science Spring. 1 credit. Limited to freshmen, sophomores, and first-year transfers.

T 1:25, W 12:20. Staff.
A forum to discuss the contemporary and future role of animals in relation to human needs and career planning.

112 Livestock Nutrition Spring. 4 credits. Prerequisite: Chemistry 103 or 207. Recommended: Animal Science 100.

Lecs, M W F 10:10; lab, M T W R or F 2-4:25. R. G. Warner.
An introduction to animal nutrition covering fundamentals of nutrition, the nutritive value of feeds, and the application of feeding standards to various forms of production in dairy and beef cattle, sheep, swine, and horses.

113 Nutrition of Companion Animals Fall, weeks 1-7. 1 credit. Prerequisite: Animal Science 112 or equivalent. S-U grades optional.

W 7:30-9:25 p.m. H. F. Hintz.
Nutrition of companion animals, with emphasis on the dog and cat. Digestive physiology, nutrient requirements, feeding practices, and interactions of nutrition and disease.

200 Animal Physiology Fall. 3 credits. Limited to sophomores and juniors except with permission of instructor. Prerequisite: a year of college biology.

Lecs, M W F 9:05. W. B. Currie.
General animal physiology with emphasis on physiologic concepts and the understanding of animal function in physiologic terms. Lectures and discussion sections are designed to encourage independent supportive study. Groups of students prepare and present demonstrations on subjects of their own choosing to the class. This course provides a basis for the study of nutrition and production and the more specialized physiology courses in animal science.

220 Animal Reproduction and Development

Spring. 4 credits. Each lab limited to 36 students. Prerequisite: a year of college biology or equivalent. Lec, T R 9:05; demonstration and lab, M T W or R 2-4:25 or T 10:10-12:35 or F 12:20-2:45.

R. H. Foote.
An introduction to the comparative anatomy and physiology of reproduction of farm animals. The life cycle from fertilization through development and growth to sexual maturity is studied, with emphasis on physiological mechanisms involved, relevant genetic control, and application to fertility regulation of animal and human populations. An audiotutorial lab 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, 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. G. F. Combs, Jr.
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.
Introduces the major components of the dairy industry. Topics discussed include breeding, feeding, reproduction, milking, milk secretion, replacement rearing, disease prevention, and record keeping. Laboratories are designed to provide limited practice in animal husbandry techniques.

251 Dairy Cattle Selection Spring. 3 credits.

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.

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 and Meat Products Spring. 3 credits.

Lecs, T R 9:05; 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.

1 credit. Prerequisite: Animal Science 100, 230, or permission of instructor. Offered alternate years.
F 2-4:25. Field trips. D. L. Cunningham.
The course is designed to provide an understanding of what takes place and is required in a commercial egg production operation.

350 Dairy Cattle Production and Management

Spring. 3 credits for students with credit in Animal Science 250 or equivalent; otherwise 4 credits. Prerequisites: either Animal Science 112, 220, 221 or permission of instructor. Recommended for students with limited dairy experience: Animal Science 250.

Lecs, M W F 9:05; lab, T W 1:25-4:25. 1 all-day field trip. W. G. Merrill, J. M. Elliot, L. D. VanVleck. Analysis of breeding, feeding, housing, and management systems for economical production; evaluation of milking systems, including principles of milk secretion and milking procedures. Includes farm visits to observe application of modern technology in operation.

360 Beef Cattle Spring. 3 credits. Prerequisite: Animal Science 100, 110, 220, 221, or permission of instructor.

Lecs, T R 10:10; lab, M T 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 perform 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 and Carcass Evaluation Fall. 2 credits. Prerequisite: Animal Science 100 or permission of instructor.

Lec and lab, W 2-4:25. J. R. Stouffer, R. D. Boyd, D. E. Hogue, M. L. Thonney. Principles and techniques of meat animal and carcass evaluation. Grading standards, meat quality, and yield factors and criteria used to evaluate growth, development, and fattening are covered in lectures and demonstrations.

400 Livestock Production in Warm Climates

Spring. 3 credits. Prerequisite: either Animal Science 112, 220, or 221 or permission of instructor.

Lecs, T R 9:05; disc W 1:25-3:20. R. E. McDowell. An analysis of the limitations the tropical environment imposes on livestock production; restrictions on contributions of animals to farm incomes owing to limitations in genetic potential; feed resources; and social structures. The role of animals on small farms and the interdependence of humans and animals for food, services, and nonfood products are stressed. The application of principles introduced in lectures is examined through discussions, problem solving, and independent study.

401 Seminar Dairy Production

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 Undergraduate Seminar Spring. 1 credit. Limited to juniors and seniors. May be repeated. S-U grades optional.

Hours to be arranged. L. D. VanVleck and staff. Review of literature pertinent to topics of animal science or reports of undergraduate research and honors projects. Students present oral and written reports.

403 Forages of the Tropics for Livestock

Production Spring. 3 credits. Limited to seniors and graduate students except by permission of instructor. Prerequisites: crop production and livestock nutrition. Offered alternate years.

Lecs, T R 12:20; disc, T 1:25. V. E. Gracen, R. E. McDowell, P. J. VanSoest. A review of tropical grasslands, sown pastures, and fodders and their use as feed resources; grass and legume characteristics; establishment and management of pastures and feed source alternatives; forage quality and utilization; problems of utilization of tropical forages as hays and silages.

410 Principles of Animal Nutrition, Lectures

Fall. 3 credits. Prerequisite: organic chemistry. Recommended: biochemistry or concurrent registration in a biochemistry course.

M W F 8; M 4:30 for students with a scheduling conflict only; 2 discs to be arranged. C. C. McCormick.

The principles of nutrition are developed from a discussion of the biochemical and physiological interaction of the nutrients as they apply to the cell and the whole animal. Examples are selected from a broad range of animal species including humans.

411 Principles of Animal Nutrition, Laboratory

Fall. 1 credit. Limited to 20 students. Prerequisite: concurrent registration in Animal Science 410.

Hours to be arranged. H. F. Hintz, R. E. Austic, G. F. Combs, Jr., C. C. McCormick, H. F. Schryver, M. L. Thonney. Lab problems with animals introduce the student to techniques of experimental nutrition.

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.

419 Animal Cytogenetics

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. Lec, 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. 19-25; sec 2, Aug. 26-Sept. 1. 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.

[440 Application of Systems Analysis in Livestock Production Management]

Fall. 3 credits. Limited to 30 students. Prerequisites: Mathematics 105 and courses in livestock production or permission of instructor. Not offered 1981-82.

M W F 9:05. P. A. Ottenacu. All-embracing systems concepts are applied to livestock production management. The use of mathematical modeling and simulation in solving management problems is illustrated with practical cases. Emphasis is on the principles behind the systems approach and not the technique's methodology.]

450 Immunophysiology

Spring. 3 credits. Prerequisite: course work in immunology or 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 Physiology and Biochemistry of Lactation

Spring. 3 credits. Prerequisite: either Animal Science 220 and Biological Sciences 231 or permission of instructor.

Lecs, T R 9:05; lab, R 2-4:25. R. C. Gorewit. Emphasis is on mammary gland development, anatomy, physiological control of milk secretion, and biochemical synthesis of milk constituents in laboratory and farm animals.

452 Comparative Physiology of Reproduction of Vertebrates (also Biological Science 452) Spring. 3 credits. Prerequisite: Animal Science 427 or permission of instructor.

Lecs, M W F 1:25. One prelim at 7:30 p.m.
A. van Tienhoven.

Sex and its manifestations. Neuroendocrinology of reproduction, sexual behavior, gametogenesis, fertilization, embryonic development, care of the zygote environment and reproduction, immunological aspects of reproduction.

454 Comparative Physiology of Reproduction of Vertebrates, Laboratory (also Biological Sciences 454) Spring. 2 credits. Prerequisite: Animal Science 452, concurrent registration in Animal Science 452 or permission of instructor.

Hours to be arranged; organizational meeting
F 2:30 first week of semester. A. van Tienhoven.
Provides students with an opportunity to independently design and execute experiments with limited objectives.

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 Fall. 3 credits. Prerequisite: Animal Science 290 or permission of instructor.

Lecs, T R 9:05; lab, M T or W 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. 3 credits maximum. 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 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.

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: either physiology, biochemistry, and nutrition or permission of instructors.

W F 11:15. R. E. Austic, M. Morrison.
An advanced course in amino acid and protein nutrition with emphasis on the dynamic aspects of protein digestion, amino acid absorption, protein synthesis, amino acid metabolism, and nitrogen excretion. Discussions include nutritional interrelationships, amino acid and protein requirements, assessment of nutritional status, evaluation of protein quality, bioavailability of amino acids, and techniques of amino acid analysis. Emphasis is on basic principles and their application in animal and human nutrition.

604 Vitamins Fall. 2 credits.

T R 10:10. G. F. Combs, Jr.
A discussion of the chemistry, biochemistry, and physiological functions of the vitamins, with emphasis on nutritional aspects.

605 Forage, Fiber, and the Rumen Spring.

4 credits. Prerequisites: either general nutrition and biochemistry or permission of instructor.

M W F 12:20; disc, W 11:15 or F 1:25.
P. J. Van Soest.

Ruminant nutrition, lower-tract fermentation in monogastrics, nutritional biochemistry of forage plants, fiber, and cellulosic material.

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. Noncredit.

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 on Problems of Livestock Production in the Tropics (International Agriculture 602)

Lipids (Nutritional Sciences 602)

Poultry Hygiene and Disease (Veterinary Medicine 255)

Basic Immunology, Lectures (Veterinary Medicine 315)

Basic Immunology, Laboratory (Veterinary Medicine 316)

The Population Biology of Health and Disease (Veterinary Medicine 330)

Health and Diseases of Animals (Veterinary Medicine 475)

Avian Diseases (Veterinary Medicine 555)

Communication Arts

N. E. Awa, H. Cogan, R. D. Colle, R. H. Crawford, B. O. Earle, S. Engstrom, C. H. Freeman, D. A. Grossman, J. E. Hardy, J. Knapp, J. E. Lawrence, R. D. Martin, R. E. Ostman, T. M. Russo, D. F. Schwartz, M. A. Shapiro, R. E. Shew, V. R. Stephen, P. Stepp, R. B. Thompson, W. B. Ward, S. Warland, S. A. White, A. M. Wilkinson

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.

Secs, M W F 10:10, M W F 11:15, or M 12:20 and T R 9:05. A. M. Wilkinson and staff.
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, and usage, grammatical structure, meaning of words, punctuation. Objective is clear, concise, concrete writing.

150 Writing for Media Fall. 3 credits. Limited to communication arts freshmen and first-year transfer students.

Lec, T 8; disc, W 12:20–2:15 or 2:30–4:25.
M. A. Shapiro.
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.

200 Theories of Human Communication Fall or spring. 3 credits. S-U grades optional. Not open to first-semester freshmen.

Lecs, T R 12:20; disc, T or R 1:25. R. B. Thompson. An introduction to human communication from a multidisciplinary perspective. Contributions from philosophy, psychology, neurology, social psychology, linguistics, anthropology, and communication theory are considered.

205 Parliamentary Procedure Fall or spring. 3 credits. Limited to 40 nonfreshman students a section. Letter grades only.

Lec, M 12:20; disc, T 1:25–3:20 or R 1:25–3:20. 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.

210 Communicating Public Information Fall. 3 credits. For those not majoring in communication arts.

M W F 8. J. E. Lawrence. Examines concepts, methods, techniques, and processes for communicating information to the general public. Explores use of public-service time and space through broadcasting, films, publications, and other channels. Emphasis on basic understanding of media requirements and procedures in disseminating public information. Students design information programs.

215 Introduction to Mass Media Fall or spring. 3 credits. Limited to 125 nonfreshman students. S-U grades optional.

Fall: lecs, W F 1:25; disc, M 1:25. Spring: lecs, W F 11:15; disc, M 11:15. R. E. Ostman. History, processes, philosophies, policies, and functions of United States communication media. Each major medium is examined individually in regard to information processing and persuasion. Effects of messages, regulation of media, and other contemporary issues are examined.

230 Visual Communication Fall. 3 credits. Limited to 100 nonfreshman and communication arts freshman students. Not recommended for art or design majors. Project materials cost about \$15–\$25.

M W F 9:05. V. R. Stephen. A basic course in the use and importance of visual communication methods and materials in today's society. Posters, charts, displays, photographs, slides, overhead projection, motion pictures, and television are among the topics discussed. Practical projects are assigned.

231 Art of Publication Spring. 3 credits. Limited to 30 communication arts students. Project materials cost about \$25–\$45.

M 1:25–4:25. 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.

301 Oral Communication Fall or spring. 3 credits. Each section limited to 24 sophomores, juniors, and seniors. Students missing the first week of classes without a University excuse are dropped so that others may register.

Disc, M W F 8, 9:05, 10:10, or 11:15; M T W 1:25; M W 9:05 and T 12:20; T R 9:05 and W 12:20; T R 9:05 and W 1:25; T R 10:10 and W 12:20; T R 10:10 and W 1:25; T R 10:10 and W 2:30; T R 11:15 and W 12:20; T R 11:15 and W 1:25; or T R 11:15 and

W 2:30. B. O. Earle, R. D. Martin, T. M. Russo, P. Stepp, R. B. Thompson, S. Warland, and staff.

A study of the basic process and principles of oral communication. Through theory and practice, the student is encouraged to develop self-confidence and competence in public speaking. Provides experience in preparing, delivering, and evaluating oral presentations.

302 Persuasion Fall or spring. 3 credits. Prerequisite: Communication Arts 301.

Lec, M 11:15; discs, T R 11:15 or 12:20 or W F 11:15. B. O. Earle. The course concentrates on the analysis and understanding of the persuasion events around us. The oral presentations stress the application of various theories of persuasion to the interpersonal communication process.

303 Small Group Communication Fall. 3 credits.

Limited to juniors and seniors. Prerequisite: Communication Arts 200 or permission of instructor. M W F 12:20. N. E. Awa. Theory and practice in leadership and participation in small-group communication. The course examines the values and limitations of group discussion, collaborative behavior, and conflicts in a democracy.

311 Radio and Television Communication Fall. 3 credits.

M W F 10:10. R. D. Colle. An overview of the roles of radio and television in contemporary society, with particular emphasis on the development, organization, and influence of these media in the United States. Attention is also given to the structure and uses of radio and television in other nations, to provide perspective on the systems here, and to the techniques and constraints involved in program production.

312 Advertising and Promotion Fall or spring.

3 credits. In the fall, limited to junior and senior communication arts majors and graduate students, others by permission of instructor. In the spring, limited to 125 juniors, seniors, and graduate students. S-U grades optional. M W 2:30–4:00. Staff.

In the fall, the course takes an industry/applied approach with considerable emphasis on the planning, creation, execution and evaluation of advertising campaigns. Workshops and lectures alternate. In the spring, the emphasis changes to consumer- and issues-orientation. Lectures only.

314 Technical and Scientific Writing and Editing

Fall or spring. 3 credits. Sections limited to 20 nonfreshman students. General sections, T R 9:05 and W 11:15, T R 10:10 and W 12:20, M W F 9:05 or 10:10, or T R 11:15 and W 12:20; biological sciences section, M W F 9:05; engineering and physical sciences section, T R 10:10 and W 12:20. J. E. Hardy, J. Knapp, A. M. Wilkinson.

Designed to develop skills in writing and editing scientific and technical information. Emphasis is on clarity, accuracy, and appropriate format. Students interpret scientific and technical information through the study of reports, instructions, brochures, and articles. One writing or editing assignment each week.

315 Basic Newswriting for Newspapers Fall and spring. 3 credits. Limited to 30 students. Prerequisite: major in communication or permission of instructor. Typing ability is essential.

R 1:25–4:25. 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.

316 Science Writing for the Mass Media Fall and spring. 3 credits.

Fall: lec, R 12:20; disc, T 12:20–2:15. Spring: lec, T 12:20; disc, F 12:20–2:15. M. Shapiro. Writing to explain and simplify scientific and technical topics for newspaper and magazine readers, radio listeners, television viewers, and educational-material consumers. Includes frequent writing assignments. Final projects include writing a newspaper or magazine article, writing a radio program, and writing and producing a television program. Students learn interviewing and research methods that ensure technical accuracy. Students should become familiar with the public policy and institutional milieu that have an effect on science writing and should reflect that knowledge in their writing.

318 Radio Writing and Production Spring. 3 credits.

T 1:25–4:25. J. E. Lawrence. Scripting and recording various public information formats for possible use on local and state radio stations. Students create complete broadcasting plans and materials for public and private organizations.

319 Television Writing and Production Spring. 3 credits. Limited to 25 students. S-U grades optional.

R 1:25–4:25. R. D. Colle. Creation of television information programs, from development of idea through research, scripting, and production.

331 Media Survey Research Spring. 3 credits.

Limited to 20 junior, senior, or graduate majors; others by permission of instructor. Prerequisites: Communication Arts 200, 215, or permission of instructor. S-U grades optional.

M W F 9:05. R. E. Ostman. Analysis of public opinion polls, market research, media audience ratings, communication strategy planning, and message research. 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.

380 Independent Honors Research in Social Science

Fall or spring. 1–6 credits. Limited to undergraduates who have met the requirements for the honors program. A maximum of 6 credits may be earned in the honors program. Students must use faculty member's section number to register.

401 Communication Law Fall. 3 credits. Limited to junior, senior, and graduate communication arts students; others by permission of instructor.

M W F 11:15. D. A. Grossman. A practical survey of the law governing mass media primarily for those working in the field. Coverage includes restraints on news gathering and publication, privacy, defamation, copyright, broadcast licensing, access, and other issues of current interest.

[403 Topics in Communication Theory Fall.

3 credits. Prerequisite: Communication Arts 200 or permission of instructor. Offered alternate years. Not offered 1981–82.

Topics in communication theory, determined by the interest of faculty and students, are discussed.]

404 Psychology of Communication Spring.

3 credits. Prerequisite: Communication Arts 200 or permission of instructor.

T R 10:10–11:25. N. E. Awa. An advanced multidisciplinary study of communication theory. Topics include personal interaction, channels of communication, and effectiveness of message. Study includes intensive analysis of primary sources of major communication theorists.

410 Organizational Communication Fall.

3 credits. Limited to 25 junior, senior, or graduate communication arts students; others by permission. Prerequisite: Communication Arts 200 or equivalent.

T R 2:30-4. D. F. Schwartz.

Study of management 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; techniques for analyzing management communication systems. Case studies assigned for discussion.

413 Writing for Magazines Fall or spring.

3 credits. Limited to juniors, seniors, and graduate students.

M 1:25-4:25. Fall, W. B. Ward; spring,

M. A. Shapiro.

Intensive fact writing to help students communicate more effectively through the medium of the printed word in magazines. Art and techniques of good writing are studied; magazines in many fields of interest are reviewed. All articles are analyzed and returned to the student to rewrite and submit to a magazine.

420 Print Media Laboratory Fall. 3 credits. Limited

to junior, senior, and graduate communication arts majors. Prerequisite: Communication Arts 231, 314, or 413.

R 1:25-4:25. J. E. Hardy, V. R. Stephen.

Writing, editing, and layout principles practiced in publishing the *Cornell Countryman*. Some additional outside work sessions may be required.

421 Broadcast Media Laboratory Fall. 2 credits.

Limited to junior and senior communication arts majors. Prerequisite: Communication Arts 318 or 319.

R 8. R. D. Colle.

Emphasis on production of television and radio programs for various audiences. Course work is done primarily through individual tutorial arrangement.

422 Print Media Laboratory Spring. 3 credits.

Limited to junior, senior, and graduate communication arts majors. Prerequisite: Communication Arts 231, 314, or 413.

R 1:25-4:25. J. E. Hardy.

A continuation of Communication Arts 420.

423 Broadcast Media Laboratory Spring.

2 credits.

Hours to be arranged. J. E. Lawrence.

A continuation of Communication Arts 421.

440 Photo Communication Fall or spring.

3 credits. Limited to 25 junior and senior communication arts majors; others by permission of instructor. For those with limited experience in photography. Students are expected to furnish their own supplies and cameras. Supplies will cost approximately \$50-\$60.

T 1:25-4:25. C. H. Freeman.

Basic photography; camera handling, film processing, projection printing, and photographic lighting. Photojournalism is emphasized during the latter part of the course.

460 Video Communication Fall or spring.

3 credits. Limited to 15 seniors or graduate students. Prerequisites: Communication Arts 150, 200, or 230, and or permission of the instructor.

F 12:20-2:50. S. White.

An overview of video communication applications. Examination of relevant organizational and visual communication theory. Development of basic competency with portable videotape recording equipment, audio and visual input to video and production, and postproduction planning and editing techniques.

497 Independent Study Fall or spring.

1-6 credits. Undergraduates must attach to their course enrollment material written permission from

the faculty member who will supervise the work and assign the grade. Students must use the faculty member's section number to register.

Staff.

Group or individual study under faculty supervision.

498 Communication Teaching Experience Fall

and spring. 1-3 credits each semester. Limited to juniors and seniors. Intended for undergraduates desiring classroom teaching experience.

Prerequisite: permission of the faculty member who will supervise the work and assign the grade. Students must use the faculty member's section number to register.

Hours 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.

1-6 credits. Limited to senior and graduate students. Seniors must attach to their course enrollment material written permission from the faculty member who will supervise the work and assign the grade. Students must use the faculty member's section number to register.

Staff.

Permits outstanding students to carry out independent studies in communications research under appropriate supervision.

601 Intercultural Communication Spring.

3 credits.

M F 10:10-11:25. N. E. Awa.

A systematic analysis of sociocultural and psycholinguistic obstacles to effective communication between cultures, subcultures, and ethnic and identity groups. Also examined are the subtleties and complexities of nonverbal behavior in cross-cultural transactions. Examples are drawn from ethnolinguistic and cross-cultural studies.

[612 Seminar: Interpersonal Communication

Spring. 3 credits. Not offered 1981-82.

W 1:25-4:25. N. E. Awa.

A study of recent advances and research in leadership, small-group interaction, and communication networks. New developments are examined as they relate to business, administration, and education.]

614 Scientific Writing for Scientists Fall or

spring. 3 credits. Prerequisites: research in progress and permission of the instructor.

T R 9:05. A. M. Wilkinson.

Workshop for students with research in progress. Discussion and lectures on writing a journal article, thesis, report, and proposal; on objectives in scientific writing, relation of rhetoric and linguistics to scientific writing, process of publication and reviewing, preparation of tables and illustrations; and on advanced and special problems in organization, paragraph development, sentence structure, and usage.

620 Communication in Organizations Fall.

3 credits. Prerequisite: permission of instructor.

W 1:25-4:25. S. A. White.

Review of theories, research, and practical systems as they relate to human communication effectiveness in organizations. Includes components of interpersonal communication, intragroup and intergroup communication, communication factors and organizational goals, skill improvement, and media in organizations—software and hardware, networking, and research methodology.

624 Communication in the Developing Nations

Spring. 3 credits. Limited to seniors and graduate students.

T R 12:20-1:35. R. H. Crawford.

An examination of existing communication patterns and systems and their contributions to the

development process. Attention is given to the interaction between communication development and national development in primarily agrarian societies.

631 Studies in Communication Fall. 3 credits.

Limited to graduate students in communication arts; others by permission of instructor.

T R 10:10-11:25. N. E. Awa.

A review of classical and contemporary research in communication, including key concepts and areas of investigation. An exploration of the scope of the field and the interrelationships of its various branches.

632 Methods of Communication Research Fall.

3 credits. Limited to graduate students.

M W 10:10-11:25. R. E. Ostman.

An analysis of the methods used in communication research. Emphasis is on understanding the rationale for experimental, descriptive (empirical and nonempirical), and historical-critical research methods.

640 Seminar in Organizational Communication

Spring. 3 credits. Open to seniors by permission.

W 1:25-4:25. S. A. White, W. Frank.

Communication functions (human and mass media) in organizational structures of business, industry, labor, education, etc., from the perspectives of academic authorities and managers. Development of conceptual schemes for analyzing components of organizational and human communication effectiveness.

643 Frontiers in Communication Fall. 3 credits.

M 1:25-4:25. R. D. Colle.

A study of recent developments in communication. Emphasis is on the application of the new methods, materials, and technology in visual, print, film, oral, and telecommunication media to contemporary and future problems significantly involving communication.

650 Advanced Communication Seminar Spring.

3 credits. Primarily for graduate students but open to seniors.

W 10:10-12:45. R. D. Colle.

An analysis of communication problems faced by various kinds of public and private sector organizations. Using case studies, the course explores some of the major components of communication strategies, particularly as they relate to communication planning. Examples are drawn from corporate communication programs, nutrition and health non-formal education projects, rural development programs, and government public information campaigns.

651 Seminar: Communication Issues Fall and

spring. 0 credit. S-U grades only.

Hours to be arranged. Staff.

The seminar deals with contemporary issues in communication, especially those related to the use of mass media as sources of information and influence, organizational communication, and intercultural communication.

690-691 Communication Teaching Laboratory

Fall and spring. 1-3 credits each semester. Limited to graduate students. Prerequisite: permission of the faculty member who will supervise the work and assign the grade. Students must use the faculty member's section number to register.

Hours to be arranged.

Designed primarily for graduate students who want experience in teaching communication courses. Students work with an instructor in developing course objectives and philosophy, planning, and teaching.

760 Advanced Communication Projects Fall or

spring. 3 credits. Limited to communications arts graduate students. May not be repeated. Students must use the faculty member's section number to register.

Staff.

Independent studies and projects are carried out in conjunction with selected undergraduate courses.

895 Directed Graduate Study Fall or spring.
3–6 credits. S-U grades only. Students must use the faculty member's section number to register.
Staff.

Education

J. P. Bail, chairman; H. G. Andrus, A. L. Berkey, G. J. Broadwell, R. L. Bruce, J. L. Compton, H. R. Cushman, W. E. Drake, J. A. Dunn, J. R. Egner, R. B. Fischer, H. A. Geiselman, M. D. Glock, 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, R. W. Tenney, H. L. Wardeberg

110 Introduction to Psychology Fall and spring.
4 credits.

Lecs, M W F 10:10; 1 disc sec to be arranged.
D. E. Hedlund.

Survey of the major areas of psychological inquiry with emphasis on the personal application of psychological knowledge to the problems of living and to current social issues, including how to be an intelligent consumer of psychological research.

240 The Art of Teaching Spring. 3 credits.

T R 1:25–2:40. G. J. Posner.
This course is designed for all students interested in finding out more about teaching. Teaching is considered an activity in which people of many occupations engage, not limited to schools. Students engage in field experiences to find out what teaching involves (minimum of 1½ hours a week). Class work builds on this experience and provides skills and concepts to make the field experience more profitable.

311 Educational Psychology Fall or spring.
3 credits. Prerequisite: introductory psychology. S-U grades optional.

Fall, M W F 11:15; R. E. Ripple. Spring, M W F 9:05; M. D. Glock.

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 2:30. J. D. Novak.

This course is intended for persons interested in the improvement of educational programs through the application of new knowledge in learning theory. Lectures and discussions are based on assigned readings and the contributions of class members. The learning theory of David Ausubel is presented in some detail. The major focus of the course is how and why concepts play a central role in human learning.

317 Psychology of Adolescence Spring.

3 credits. Prerequisite: introductory psychology. S-U grades optional.

T R 12:20–1:25. R. E. Ripple.

A survey of the nature of adolescent development, with emphasis on causal factors of adolescent behavior. Focus is on an examination of the interrelationships among the major aspects of adolescent development, an examination of some of the dominant themes of adolescence, acquaintance with research on adolescent development, and implications for the educational process.

331 Introduction to Teaching Agriculture Spring.
2 credits. Required of persons who plan to enter the student teaching program.

Lec, M 2–4:25; lab to be arranged. W. E. Drake.

An introduction to the origin, development of curricula, and methods of teaching agriculture in secondary schools. Purposes are (1) to provide exploratory experience in teaching and extension professions and (2) to prepare prospective teachers for participation in the resident student teaching program leading to teacher certification.

335 Youth Organizations Spring. 3 credits.

Prerequisite: introductory psychology.

Lecs, T R 10:10; lab to be arranged. R. W. Tenney.
The role of selected youth organizations in providing educational experiences for youth. Factors affecting membership, purposes, design, operation, and administration are surveyed, emphasizing the roles the adult volunteer leader may play. The course is designed to give the student an in-depth, learning-by-doing experience of how youth organizations function. Field experience with a recognized youth organization is required.

340 Theories of Teaching Fall. 3 credits.

M W 2:30–3:45. G. J. Posner, K. A. Strike.

This course is intended to assist the student in conceptualizing the process and contexts of teaching in school and nonschool settings. The course examines representative theories of teaching and provides an opportunity for students to develop their own views.

352 Reading Statistics Fall or spring. 1 credit.

Prerequisite for spring: concurrent registration in Education 353.

Fall, T 12:20; spring, T R 8:30–9. J. Millman.

An introduction to statistical vocabulary and symbolism frequently used in reporting empirical research in education and other social sciences. Students are taught how to comprehend statistical terminology and results.

353 Introduction to Educational Statistics

Spring. 3 credits. Prerequisite: 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 the social, political, and economic issues that affect teaching and learning in schools and other settings. Included are such issues as educational opportunity, governance and policymaking, school and community, the economics of education, and the teacher in a social context.

371 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.

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.

400 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.

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, 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 records 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: lec, M 10:10; labs, M R 1:25–4:30. Spring:

lec, M 10:10; lab, M 1:25–4:30. R. B. Fischer.

This course provides students who plan to be professional environmental interpreters and educators with methods and materials for sensitizing people about 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 school and environmental centers. Includes practical experiences in local schools and youth centers.

411 Educational Measurement Fall. 3 credits.

Prerequisite: permission of instructor.

T 2:30–4:25; 1 additional hour to be arranged.

M. D. Glock.

Demonstrations of administration for procedural tests. Construction of achievement tests and use of other measuring instruments in classification and guidance for improvement of instruction. Emphasis is on the use of formal and informal instruments.

413 Psychology of Human Interaction Fall.

3 credits. Fee, \$5.

T R 10:10–12:05. D. E. Hedlund.

Designed to develop skills for and understanding of effective interpersonal communication and interaction. The course is largely experiential, utilizing 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.

430 Special Problems in Agricultural Education Fall, spring, and summer. 1–3 credits. S-U grades optional.

Fall and summer: hours to be arranged. Spring: T 8. R. W. Tenney.

An opportunity to study individually selected problems in agricultural education.

432 Teaching Agriculture: Methods, Materials, Practice Fall. 9 credits. Prerequisite: Education 331. Education 434 may be taken concurrently.

M T W R F 8–3. A. L. Berkey and staff.
Directed participation in teaching agriculture at the secondary school level. Program includes an intensive four-week on-campus period where methods and materials of teaching agriculture are treated in detail, combined with a ten-week period in a student teaching center. Includes evaluation of area resources, instructional materials and facilities, development of curricula, directing work experience, planning instruction, and advising youth organizations.

434 Adult Education Programs in Agriculture Fall. 3 credits. Prerequisite: concurrent registration in Education 432.

Lec to be arranged. H. R. Cushman.
Determining instructional needs, planning programs of instruction, teaching in groups, giving on-the-job instruction, and evaluating adult education programs in agriculture.

435 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.

445 Curriculum Design Fall. 3 credits. Education 545 may be taken concurrently.

T R 10:10–11:30. G. J. Posner.
A general practical approach to course planning. Readings, group discussions, workshops, and individual conferences centering on each student's project. This project consists of designing a course in a subject area, for an age level and an institutional setting of the student's choosing.

446 Implementing Instruction Spring. 2 credits. Lec-lab, W 1:25–4:25. V. N. Rockcastle.

A study of the elements of effective instruction in lecture, laboratory, seminar, field trip, and other modes of instruction. Practice in developing and presenting various modes of instruction, with critiques by the class.

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 the implications for education assessed.

[473 Contemporary Philosophy of Education Spring. 3 credits. M W 11:15; disc, 1 hour to be arranged. D. B. Gowin. Not offered 1981–82.]

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. T R 12:20–1:50. D. H. Monk.

An introduction to the use of economic principles to study education and educational policy. Specific attention is given to the impact of education on 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 alternate types of schooling. No formal training in economics is presupposed.

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.

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 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.

511 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.

512 Standardized Tests: Use and Interpretation Fall. 3 credits.

R 3:35–5:15, 1 additional hour to be arranged. Staff.
For teachers, counselors, or personnel majors who plan to work with standardized tests.

513 A Theory of Education Fall. 3 credits. Prerequisite: Education 311 or 511, or permission of instructor. T R 9:05. J. D. Novak.

Presents a coherent theory of education combining concepts from philosophy, psychology of learning, curriculum, and instruction. Classes include discussion of student-initiated questions. Students are assisted in applying theory to their own discipline.

[514 Group Processes in Education Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. Not offered 1981–82. T R 10:10–12:20. D. E. Hedlund.]

515 Affective Education Spring. 3 credits. Prerequisite: permission of instructor.

M W 1:25–3:30. D. E. Hedlund.
This course examines the conceptual base and the methodology of teaching for objectives in the affective realm. The first part of the semester is devoted to the intrapersonal dynamics of individual development and the relationship of affective and cognitive learning. The second part focuses on the interactive nature of the teaching-learning transaction and the effective use of small-group dynamics in teaching. The capability to design teaching-learning experiences that incorporate affective objectives is a major goal. The course is largely experiential, providing participation in a variety of approaches to affective education.

519 Methods of Educational Inquiry Fall. 1–3 credits. Prerequisite: statistics, Education 352, or concurrent registration in Education 352. T R (see below for times). J. Millman.

Techniques of empirical research are offered in four independent units: (a) survey of empirical approaches to social science inquiry, (b) design of educational research, (c) methods of data collection, and (d) practicum in doing a mini research study and writing a research proposal. Course credit varies depending upon the number of units the student elects. Units a, b and c are covered 2:30–4 during the first, second and third weeks of the semester respectively. Unit d is covered 4:10–5 on T throughout the semester.

535 Continuing Education Programs 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.

[543 Structure of Knowledge and Curriculum Spring. 3 credits. Prerequisite: permission of instructor. M W 12:20–2:10. D. B. Gowin. Not offered 1981–82.]

544 Teaching Mathematics Spring. 3 credits. T R 2:30–3:45. H. A. Geiselman.

Intended to provide competence in presenting mathematics using various approaches—discovery, audiovisual aids, laboratory techniques, individualized instruction, use of games, puzzles; acquaintance with teaching resources; geometrical constructions; discussion of the slow learner. Each student selects a project and presents it to the class.

545 Curriculum Theory and Analysis Fall. 3 credits. Prerequisite: Education 311 or 511, concurrent registration in Education 511, or permission of instructor.

M W 10:10–11:30. G. J. Posner.
An examination of the basic elements involved in making curriculum decisions and an analysis of current approaches to curriculum. Students learn to analyze a curriculum in the context of a conceptual framework. This course is the basic graduate course in curriculum.

546 Evaluation for Program Management Spring. 1-3 credits. S-U grades optional. M 2:30-5. R. L. Bruce.
The course will consist of three modules, each for one 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.

561 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.

562 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.

[563 Governance of Public Education Fall. 3 credits. Offered alternate years. Not offered 1981-82.

W 3:35-6. E. J. Haller.
Consideration of the structure of control in public education. Relationships among federal, state, and local agencies and the administrative roles in school districts. Considerable attention is directed to social and political analysis of the community.]

564 Educational Finance Fall. 3 credits. S-U grades optional.

W 9-11. D. H. Monk.
Attention is focused on tasks and procedures involved in budgeting, support systems, allocation, control, accountability, and the measurement and reporting of benefits and productivity. An opportunity for individuals to focus on their own areas of interest, such as occupational education, the two-year college, the secondary school, or higher education.

565 Systems Analysis in Educational Administration Spring. 3 credits. S-U grades optional.

W 9:05-11, plus one hour to be arranged.
D. H. Monk.
An exploration of the usefulness of economic tools of analysis in the study of educational productivity and the management of educational systems. Topics include the impact of state and federal policy on the internal operation of educational organizations, programming approaches to budgeting and scheduling, collective bargaining and the compensation of personnel, input-output analysis of productivity, resource allocation in classrooms, and the economics of instruction. No previous training in economics is assumed.

567 Administration of Higher Education Summer. 3 credits. S-U grades optional.

M-R 10-12 and 2-4. R. I. Miller.
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.

[569 Personnel Development: Issues in Higher Education Spring. 3 credits. Not offered 1981-82. R 3:35-6. H. L. Wardeberg.

An examination of selected issues that affect the administration and development of academic and nonacademic personnel in continuing and higher education institutions.]

574 History of American Education Fall. 3 credits.

M 3:35-5:15. Instructor to be announced.
An examination of American schools, colleges, and other educative agencies from colonial beginnings to the present. An attempt is made to view education in the context of the evolution of American norms and values.

575 Educational Policy Development and Decision Making Fall. 3 credits. S-U grades optional.

R 3:35-5:30. E. J. Haller.
This course provides an introduction to the policymaking process in and around the educational institution. After a consideration of the nature of public policy, topics included are governmental responsiveness, power and influence in policymaking, political parties and interest groups, and administration as policymaking. The class is organized as a seminar. Each student prepares and presents a paper relevant to one of the topics considered.

590 Special Topics in Education Fall, spring, summer. 3 credits. Prerequisite: permission of instructor.

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.

600 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.

601 Research Seminar Fall and spring. 0 credits. M 4-5:30.

Presentation of current research in the field of education by graduate students and staff. Opportunities to discuss methodology, findings, and other aspects of research.

602 Proseminar in Organization and Management of Sponsored Research Fall and spring. 2 credits each term. S-U grades optional. Prerequisite: permission of instructor.

F 2:30-4. J. A. Dunn.
Designed for doctoral students, advanced graduate students, and practitioners in the field who have responsibility for the promotion, management, or supervision of educational research, development, or evaluation projects. The seminar is devoted to an in-depth review of the history of educational research, patterns of federal support, the federal procurement process, and proposal preparation. Successful and unsuccessful proposals are analyzed. Attention is given to alternative strategies for proposal development.

606 Seminar in Science and Environmental Education Fall or spring. 1 credit.

T 7:30-9:30 p.m. V. N. Rockcastle, R. B. Fischer.
Coordinates various interest groups in science and environmental education. Discussions center around

curriculum development, research and thesis writing, and current problems. Special emphasis for fall term: energy, its meaning, use, and conservation.

611 Seminar in Educational Psychology and Curriculum Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. Offered alternate years.

Hours to be arranged. R. E. Ripple.
Selected aspects of the relationship between curriculum and the psychology of education. Emphasis is on the psychology of human learning and implications for structuring learning experiences and curriculum development. Appropriate for graduate students in educational psychology, curriculum, and instruction and others with interests in the relationship between psychology and curriculum.

615 Seminar in Counseling Psychology Fall or spring. Variable credit. S-U grades only.

W 1:25-3:30. D. E. Hedlund.
Selected topics in counseling psychology to be announced.

618 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 and R. L. Bruce.
Deals with adult development and learning behavior from points of view of educational psychology, social psychology, and sociology. Inferences are drawn from theory and research to the practice of adult continuing education. Appropriate for graduate students in educational psychology, extension and continuing education, community service education, and others interested in adult learning and development.

[619 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. Not offered 1981-82.]

624 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.

627 Behavioral Change in International Rural Modernization Fall. 3 credits. For students who have interest or experience in international rural development or community development.

J. L. Compton.
An exploration of the social psychological aspects of socioeconomic development, focusing on the theoretical orientations of individual modernity, values-beliefs-motives, achievement motivation, entrepreneurship, innovativeness, expectancies, and self-efficacy and the applied orientations of communication-diffusion of innovation-adoption behavior, nonformal education, community development, planned change, and change agency.

[628 Community Education Fall. 3 credits. For students who have interest or experience in education or development programs where community is an important concern. Not offered 1981-82.

W 2:30-5. J. L. Compton.
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 such public institutions as community colleges, cooperative extension, social work, and community schools, and

such functional dimensions of community education programming as participatory decision making, paraprofessionals, volunteers, leadership development, council formation and function, interagency coordination, and change agent roles.]

629 Comparative Extension Education Spring. 3 credits. Prerequisite: Education 627 or permission of instructor.

R 1:25–4:25. J. L. Compton.

Extension education in the developing nations are studied using, as an analytical frame of reference, a hypothetical model comprised of such components as community organization, community-based learning, indigenous facilitators and leaders, extension generalists and specialists, residential training, and research-training linkages. Case materials on alternative extension models and intercounty experiences provide an empirical base.

630 Special Problems in Agricultural and Occupational Education Fall and spring; may also be offered in Summer Session. 1–3 credits. S-U grades optional.

Hours to be arranged. R. W. Tenney and staff.

The course provides an opportunity for graduate-level study of individually selected problems and issues in agricultural and occupational education. Designed for experienced teachers.

632 Teaching Agricultural and Occupational Education Spring. 3 credits. Prerequisite: an introductory course in teaching methods or permission of instructor.

M 2:30–5. A. L. Berkey.

The focus of the course is on the selection, use, and evaluation of methods and materials for teaching occupational subjects. Methods for both group and laboratory instruction are covered. Opportunity is provided through use of modules for students to develop teaching competencies based on their individual needs and interests. Development of self-evaluation skills is included. A class project on the selection or development of instructional materials is required.

633 Curriculum in Agricultural and Occupational Education Fall. 3 credits.

M 1:25–3:30; labs to be arranged. W. E. Drake.

Current situations affecting occupational education curricula are examined. Principles, objectives, and sources of information are developed for planning curricula. Strategies for developing occupational courses are examined. Consideration is given to planning, developing, and managing work experience programs. Participants have an opportunity to observe ongoing programs at the secondary and two-year-college levels and pursue individual interests in curriculum improvement.

634 Adult Education Programs: Organization and Direction Fall. 3 credits.

F 1:25–4:20. H. R. Cushman.

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.

635 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.

636 Occupational Education Program: Administration and Supervision Spring. 3 credits. Offered alternate years. Not offered 1981–82.

W 2–4:15; 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.

639 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.

645 Seminar in Curriculum Theory and Research Spring. 3 credits. Prerequisite: Education 445–545 or permission of instructor.

Hours to be arranged. G. J. Posner.

Theoretical issues in curriculum and appropriate areas for curriculum research are discussed.

669 Studies in Educational Administration

Spring. 3 credits. S-U grades only.

W 3:35–6. E. J. Haller.

An analysis and critique of current research in educational administration. Discussion of research priorities and strategies in the conceptual area of educational governance. For graduate students interested in conduct of research on problems of educational governance.

[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. Not offered 1981–82.]

[678 Economics of Rural Education] Spring. 3 credits. Prerequisite: Education 478 or permission of instructor. Offered alternate years. Not offered 1981–82.

T R 12:20–1:50. D. H. Monk.

The application of economics to the analysis of current issues concerning manpower planning and human capital development and utilization in rural areas. The course concentrates on the case of rural education in developing as well as industrialized nations. Attention is given to both formal and nonformal types of education.]

679 Economics of Higher Education Spring. 3 credits. Prerequisite: Education 478 or permission of instructor. Offered alternate years.

T R 12:20–1:50. D. H. Monk.

Applications of economics to the study of 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.

711 Seminar in Educational Psychology Fall. 3 credits. Prerequisite: permission of instructor before first meeting. S-U grades optional.

W 4:30–6:30. M. D. Glock.

The seminar has varied emphasis from year to year. See the instructor for current topic.

716 Seminar in Educational Research and Evaluation Fall or spring. 3 credits. Prerequisite: permission of instructor. S-U grades only.

Hours to be arranged. J. Millman.

An intensive study of the literature in a particular area of research methodology. Topics in recent years have included procedures and issues in educational evaluation, the interface of instruction and measurement, and the design of educational experiments. Current topic to be announced.

730 Seminar in Agricultural and Occupational Education Spring. 2 credits. S-U grades optional. R 2:30–4:25. H. R. Cushman.

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.

[771 Seminar in the Sociology of Education] Fall. 3 credits. S-U grades optional. Not offered 1981–82.

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. S-U grades optional. Prerequisite: permission of instructor.

Hours to be arranged. K. A. Strike.

Topics to be announced.

800 Master's-Level Thesis Research Fall or spring. Credit arranged. S-U grades optional. Each registration must be approved by a faculty member who will assume responsibility for guiding the work.

Staff.

Limited to students working on theses or other research and development projects.

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; C. O. Berg, emeritus; W. L. Brown, Jr., R. I. Carruthers, W. Cupp, J. E. Dewey, G. C. Eickwort, P. P. Feeny, J. G. Franclemont, emeritus, G. G. Gyrisco, H. H. Hagedorn, W. T. Johnson, J. P. Kramer, R. A. Morse, A. A. Muka, L. L. Pechuman, B. L. Peckarsky, D. Pimentel, E. M. Raffensperger, R. B. Root, D. A. Rutz, A. Sawyer, M. Semel, E. H. Smith, W. M. Tingey, Q. D. Wheeler, C. F. Wilkinson, R. G. Young

Courses by Subject

Apiculture: 260, 262, 264
Behavior: 662
Ecology: 370, 455, 457, 471, 664, 672, 695
Introductory courses: 200, 212
Medical entomology and pathology: 452, 453
Morphology: 322
Pest management: 241, 342, 440, 443, 640, 677
Physiology and toxicology: 483, 685, 687, 690
Systematics, araneology, and acarology: 331, 332, 621, 622, 631, 633, 634, 635, 636

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 R or F 2-4:25.

G. C. Eickwort.

Introduces the science of entomology by focusing on basic principles of systematics, morphology, physiology, behavior, and ecology of insects. The laboratory in early fall includes field trips to collect and study insects in the natural environment. A small collection stressing ecological categories is required.

241 Applied Entomology Spring, 3 credits.

Prerequisite: Biological Sciences 101-102 or equivalent.

Lecs, T R 10:10; lab, M T W R or F 2-4:25.

E. M. Raffensperger.

A compendium of the insects associated with crops and farm animals. Discussions of insect pest management requirements on farm and garden, along with descriptions of control methods, materials, and equipment.

260 Introductory Beekeeping Fall, 2 credits.

T R 11:15. R. A. Morse.

Introduces the fundamentals of beekeeping, including the life history, instincts, and general behavior of honey bees. Attention is given to the biology of the honey bee. Some lectures are devoted to pollination of agricultural crops and the production of honey and beeswax.

262 Communication and Social Behavior of the Honey Bee Fall, 1 credit. Limited to 10 students.

Prerequisite: permission of instructor.

Labs, S afternoons or weekends to be arranged; evening seminar-lecture to be arranged.

R. A. Morse.

Intended for those interested in the honey bee society as a system for the study of social behavior. Participants present topics they are interested in. Laboratories allow direct observation of living bees and introduce some important research techniques. The need for fair weather requires that laboratory scheduling be flexible.

264 Practical Beekeeping Fall, 1 credit. Limited to 20 students. Prerequisite: Entomology 260 (may be taken concurrently).

Lab, R or F 2-4:25. R. A. Morse.

Fourteen labs to acquaint students with practical methods of colony management. Labs involve actual work with package bees and mature colonies. Three labs are concerned with apple pollination and methods of moving colonies into orchards.

322 Insect Morphology Fall, 5 credits.

Prerequisite: Entomology 212 or 241. Offered alternate years.

Lecs, M W F 10:10; labs, M F or T R 1:25-4:25.

G. C. Eickwort.

An introduction to the external and internal anatomy of insects, with emphasis on the comparative and functional aspects. The laboratory is devoted largely to dissection.

331 Introductory Insect Systematics Spring,

4 credits. Prerequisite: Entomology 212; concurrent enrollment in Entomology 332 recommended.

Lecs, T R 10:10; labs, T R 1:25-4:25; Saturday field trips. W. L. Brown.

An introduction to the classification, evolutionary history, and distribution of the insects. Laboratory practice in the identification of orders, families, and representative genera of insects; methods of collection, preservation, and study. Lectures on theory and practice of insect systematics and major features of insect evolution. Insect collections are required.

332 Systematics Discussion Group Spring,

1 credit. Prerequisite: concurrent enrollment in Entomology 331 or permission of instructor. S-U grades only.

Disc, hours to be arranged. W. L. Brown.

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 Fall, 2 credits.

Prerequisites: Biological Sciences 101-102 or equivalent.

Lecs, T R 9:05. D. M. Soderlund.

A survey of the different types of pesticides, their uses, their distribution in the environment, and their effects on various components of the environment. For students whose main emphasis is not in pesticide usage.

440 Insect Pest Management Spring, 4 credits.

Prerequisites: Entomology 212 or 241, and Entomology 400 or Biological Sciences 360, or permission of instructor.

Lecs, M W F 9:05; lab, M 1:25-4. A. J. Sawyer.

A lecture and laboratory introduction to principles and techniques of insect pest management as these relate to the diverse problems in contemporary economic entomology.

443 Pathology and Entomology of Trees and Shrubs (also Plant Pathology 443)

See Plant Pathology 443 for course description.

452 Medical Entomology Fall, 3 credits.

Prerequisites: either Entomology 212 and Veterinary Medicine 330 or permission of instructor.

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.

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. Lab investigations center around living insect-pathogen associations and the consequences of these associations for both insect and microbe.

455 Insect Ecology, Lectures (also Biological Sciences 455) Fall, 2 credits. Prerequisites:

Biological Sciences 360 and Entomology 212, or their equivalents. Recommended: concurrent enrollment in Biological Sciences 457. Offered alternate years.

Lecs, W F 11:15. R. B. Root.

Ecological and evolutionary principles are integrated by thorough examination of outstanding investigations. Topics discussed include the factors responsible for the great diversity of insects, adaptive syndromes associated with climate, natural history of arthropod guilds, impact of insects on terrestrial vegetation, population regulation, and the contrast between natural and managed ecosystems.

457 Insect Ecology, Laboratory (also Biological Sciences 457) Fall, 2 credits. Limited to 16

students. Prerequisite: concurrent enrollment in Biological Sciences 455. Offered alternate years.

Lab, W 1:25-4:25; F or S field trips to be arranged during the field season. R. B. Root.

Field exercises focus on insect natural history and methods of sampling populations. Laboratories devoted to rearing insects, estimating life-table parameters, and analyzing communities.

471 Ecology and Systematics of Freshwater Invertebrates Spring, 4 credits. Prerequisite:

Entomology 212. Recommended: Biological Sciences 360-462-464.

Lecs, T R 9:05; labs, M W or T R 1:25-4:25.

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 and a course in biochemistry.

Lecs, M W F 11:15; lab, W or F 1:25.

H. H. Hagedorn.

An introduction to insect physiology, with emphasis on development and organ systems.

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.

[618 Techniques of Biological Literature Fall, 2 credits. Offered alternate years. Not offered 1981-82.

Lecs, T R 9:05. J. G. Franclemont.

The history of the development of entomological literature and a critical study of the biologists' works of reference. Practice in the use of indexes and use and preparation of bibliographies.]

[621 Acarology Fall, 4 credits. Prerequisites: Entomology 212 and permission of instructor. Offered alternate years. Not offered 1981-82.

Lecs, M F 10:10; labs, M F 1:25-4:25.

G. C. Eickwort.

An introduction to the taxonomy, morphology, and bionomics of mites and ticks, with emphasis on taxa of economic importance. A collection is required.]

622 Principles of Systematics (also Biological Sciences 622) Spring, 4 credits. Prerequisite:

Entomology 331 or introductory systematics course in another field of biological sciences.

Lecs, M W 1:25; labs, M W 2-4:25; disc, hours to be arranged. Staff (Q. D. Wheeler, coordinator).

An introduction to modern theory and methods of systematic biology. Lectures on theoretical systematics including species concepts, classification, phylogenetics, and biogeography. Laboratories include modern methods of finding characters (such as comparative morphology, karyology, electrophoresis, ontogenetic sequencing) and various methods of analysis of data (e.g., cladistic hand and computer methods, numerical methods). Part of laboratory grade is based on a final paper.

[631 Systematics of the Coleoptera Fall,

4 credits. Prerequisite: Entomology 331. Offered alternate years. Not offered 1981-82.

Lecs, M W 12:20; labs, M W 1:25-4:25. Saturday field trips. Q. D. Wheeler.

A comprehensive review of the comparative morphology, phylogenetic relationships, classification, natural history, and distribution of the Coleoptera, including adult and immature stages. Laboratory practice in identification and methods for collection and study of beetles. A collection is required.]

***[633 Systematics of the Diptera and Hymenoptera]**

Spring. 3 credits. Prerequisite: Entomology 331. Offered alternate years. Not offered 1981-82.

Lecs, W 10:10; labs, W F 2-4:25. W. L. Brown. Lectures on the classification, evolution, and bionomics of the Diptera and Hymenoptera. Laboratory studies on the literature, characters, and classification of representative genera and species of these orders, based on adult and immature stages.]

***[634 Special Topics in Systematic Entomology]**

Fall or spring; taught on demand. 2-4 credits.

Prerequisite: permission of instructor.

Hours to be arranged. Staff. Lectures on the classification, evolution, and bionomics of selected taxa, with accompanying laboratory studies on identification and comparative morphology. Collections sometimes required.

[635 Araneology]

Fall. 2 credits. Prerequisites: Entomology 212 and permission of instructor. Offered alternate years. Not offered 1981-82.

Lec and lab, R 2-4:25. D. B. Zepp. Introduction to the systematics, morphology, physiology, behavior, and ecology of spiders and the other arachnids, with emphasis on identification and biology. A collection is required.]

[636 Seminar in Systematic Entomology]

Fall or spring. 1 credit. Prerequisite: permission of instructor. 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 Systems]

Fall. 4 credits. Prerequisites: Biological Sciences 360, Entomology 440 or Plant Pathology 504, and a course in calculus. Recommended: an introductory course in computer science. S-U grades optional. Offered alternate years. Not offered 1981-82.

Lecs, M W F 9:05; disc, W 2:30-4:25. A. J. Sawyer. Quantitative aspects of the development of pest and agricultural resource management systems. A major portion of the course deals with predictive simulation models and quantitative research. Other topics include philosophy, use of literature, systems analysis, management and design, and communications and monitoring systems.]

[662 Insect Behavior Seminar]

Spring. 1 credit. Prerequisites: permission of instructors and either Entomology 212 and Biological Sciences 321 or equivalents. Offered alternate years.

Hours to be arranged. G. C. Eickwort, M. J. Tauber.

[664 Seminar in Coevolution Between Insects and Plants]

Spring. 2 credits. Limited to 15 students. Prerequisites: entomology, ecology, evolution, organic chemistry, and written permission of instructor. S-U grades optional. Offered alternate years. Not offered 1981-82.

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.

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 will be encouraged.

[677 Biological Control]

Fall. 3 credits. Prerequisites: Entomology 212, Biological Sciences 360, and permission of instructor. Offered alternate years. Not offered 1981-82.

Lecs, T R 9:05; lab, T 2-4:25. M. J. Tauber.

Theory and method of biological control of arthropod pests and weeds. Lab includes studies with living parasites and predators.]

[685 Seminar in Insect Physiology]

Spring. 1 credit. Prerequisites: Entomology 483 (may be taken concurrently) and permission of instructor.

Hours to be arranged. H. H. Hagedorn.

[690 Insect Toxicology and Insecticidal Chemistry]

Spring. 4 credits. Prerequisites: general chemistry and organic chemistry. Undergraduate students by permission of instructor. Offered alternate years. Not offered 1981-82.

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, J. W. Boodley, E. J. Carter, A. M. Elliot, C. C. Fischer, R. T. Fox, G. L. Good, T. H. Johnson, R. J. Lambert, R. W. Langhans, A. S. Lieberman, L. J. Mirin, R. G. Mower, K. W. Mudge, F. B. Negm, A. M. Petrovic, E. F. Schaufler, J. G. Seeley, P. J. Trowbridge

Courses by Subject

Commercial floriculture crop production: 424, 425, Freehand drawing and illustration: see page 00. Horticultural physiology: 401, 402, 601 Introductory courses: 100, 105 Landscape architecture (professionally accredited program): see pages 00 and 00. Landscape horticulture: Landscape Architecture 104, 220, 221, 224, 240, 311, 340, 431, 432, 531, 532. Nursery management: 317. Plant materials: 213, 312, 313, 322, 342, 450. Retail floriculture: 105, 325. Turfgrass management: 314, 318.

100 Introductory Floriculture and Ornamental Horticulture

Fall. 3 credits. Principally for freshmen. S-U grades optional for students not specializing in floriculture and ornamental horticulture. Field trip costs about \$25 plus room and meals.

Lecs, M W 8; lab, T or W 2-4:25. J. W. Boodley. An introduction to basic plant physiology and plant

processes, control of the plant environment, and the floriculture and ornamental horticulture industry and opportunities. A required field trip to visit commercial enterprises is made.

105 Floral Design Fall or spring. 2 credits. Each lab limited to 22 students. Prerequisite: permission of instructor; preference given to plant science majors, then to students in education, design, and journalism studies. Students whose careers will involve using this horticultural expertise should apply. There is a \$25 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 20 of their absence will automatically be dropped from the course.

Lec-lab, T W or R 1:25-4:25. C. C. Fischer. A study of the established floral design techniques of this country presenting the principles and the mechanics of the art to prepare the student to design for varying themes and occasions. Other aspects include selection, preparation, and factors affecting keeping quality of plant materials, emphasizing the economical use of all supplies.

213 Woody Plant Materials

Spring. 4 credits. Lec, T R 9:05; lab, T 1:30-4:30 (two sections to be arranged) and W or F 2-4:25. R. G. Mower. A study of the trees, shrubs, and vines used in landscape plantings. Emphasis is on winter identification and their values for use as landscape material.

312 Garden and Interior Plants I

Fall. 3 credits. Lec, T R 10:10; lab, T 1:30-4:30 (two sections to be arranged). 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 lab 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.

Lec, W 10:10; lab, F 9:05-12:05. R. G. Mower. A study of the trees, shrubs, vines, and ground covers used in landscape plantings in the northeastern United States. Emphasis is on leaf identification and on characteristics that determine their usefulness as landscape subjects. Opportunity for independent study is provided.

314 Turfgrass Management

Fall. 3 credits. Prerequisites: Agronomy 200. Biological Sciences 242 recommended or permission of instructor. Lec, M F 12:20; lab, F 1:25-4:25. A. M. Petrovic. The scientific principles, practices, and materials for the construction and maintenance of lawn, sports, and utility turfgrass areas. Environmental effects on growth are also studied.

317 Nursery Crop Production and Maintenance

Fall. 4 credits. Prerequisite: Floriculture 401. Lec, M W F 9; lab, M 12:20-2:15, 2:30-4:25. Field trips are included in lab sessions. G. L. Good. Problems of commercial propagation and growth of nursery plants to marketable stage including harvesting, storing, and packaging nursery stock. Some consideration is given to the planting and culture of landscape plants.

318 Advanced Turfgrass Management

Fall. 2 credits. Prerequisites: Floriculture 314 or equivalent, and permission of instructor. 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.

Lecs, M W 11:15; lab, M 1:30–4:30 (two sections to be arranged). R. G. Mower.

A continuation of Floriculture 312. The first seven weeks are devoted to a further study of interior plants with emphasis on specialized groups of interior plants 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 labs 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, \$25. Cost for field trips, \$15 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 and distinguishing families and to preparing and using analytical keys; attention is also given to the economic importance of taxa, to the basic taxonomic literature, and to the elements of nomenclature.

401 Principles of Plant Propagation Fall.

3 credits. Prerequisite: Biological Sciences 242 or 341 or permission of instructor.

Lecs, T R 8; lab, R 1:25–4:25. K. W. Mudge. Physiological, environmental, and anatomical factors involved in the propagation of plants by seed germination, rooting of cuttings, layering, grafting, budding, bulbs, tissue culture, et cetera. Examples include horticultural, agronomic, and forestry crops.

402 Physiology of Horticultural Plants Spring.

4 credits. Prerequisite: Biological Sciences 242 or 342 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.

424 Principles of Florist Crop Production Spring.

4 credits. Limited to 30 students. Preference given to juniors. Prerequisites: Floriculture 401 and Biological Sciences 242, 342 (may be taken concurrently), or equivalent; or permission of instructor. Cost for field trips, \$20 plus meals.

Lecs, M W F 9:05; lab, R 2–4:25. J. G. Seeley. Commercial production of florist crops. Emphasis on principles of culture of ornamental plants as influenced by greenhouse environment. 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, \$100.

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, and watering systems, and business analysis and management.

450 Special Topics on Ornamental Plants Fall or

spring. Credit to be arranged. Limited to 15 students. Primarily for upperclass floriculture and ornamental horticulture majors. Prerequisites: Floriculture 213, 312, or 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 Problems in Floriculture and Ornamental Horticulture

1 or more credits. S-U grades optional. Prerequisite: students must satisfy the staff member under whom the work is to be taken that their background warrants their choice of problems. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work and assign the grade.

C. F. Gortzig and staff.

Work on problems under investigation by the department or of special interest to the student.

600 Seminar Fall or spring. For department staff

and graduate students. S-U grades only.

R 12:10.

601 Current Topics in Floricultural and Ornamental Horticultural Physiology Spring.

Variable credit. Prerequisite: permission of instructor.

Hours to be arranged. F. B. Negm.

Discussions of modern concepts, research, and commercial problems as reflected in current horticultural literature.

Freehand Drawing and Illustration**109 Drawing for Landscape Architects** Fall.

3 credits. Primarily for department majors; others admitted with permission of instructor. Limited to 25 students.

Lec, R 10:10; studio, T 9:05–11, R 1:25–4:25.

A. Elliot.

Emphasizes the development of a graphic language and an approach to freehand perspective. Outside sketchbook assignments.

111 Freehand Drawing Fall or spring. 3 credits.

Each section limited to 25 students. Prerequisite: permission of instructor. S-U grades optional. Credit may not be received for both Floriculture 109 and 111.

Fall: M W F 10:10–12:05. Spring: lec, T or W 10:10; 5 additional studio hours a week scheduled in 2- or 3-hour periods during M T W R F 9:05–12:05, T 2–4:25. A. Elliot.

Objective is to develop accuracy of observation and skill in delineation. Practice is given in outdoor sketching and still-life and figure drawing. Principles of freehand perspective are taught and applied. Outside sketchbook assignments.

210 Perspective for Landscape Architects

Spring. 3 credits. Primarily for department majors.

T R 1:25–4:25. R. J. Lambert.

Practice in perspective construction from plans and elevations, rendering techniques, and basic design principles. Outside sketchbook assignments.

211 Freehand Drawing and Illustration Fall.

2 credits. Prerequisite: Floriculture 111 or equivalent. S-U grades optional. Not offered 1981–82.

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.

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.

316 Advanced Drawing Fall or spring. 2 credits.

Prerequisite: Floriculture 211 or permission of instructor. S-U grades optional. Not offered fall 1981.

6 hours to be arranged. A. Elliot, R. J. Lambert. For students who want to attain proficiency in a particular type of illustration or technique.

417 Scientific Illustration Fall. 2 credits.

Prerequisite: Floriculture 211 or 316 or equivalent. S-U grades optional for graduate students only.

6 studio hours scheduled between 9:05 and 12:05 M T W R. A. Elliot.

A survey of methods of illustration. Training in techniques of accurate representation in media suitable for reproduction processes, including pen and ink, scratchboard, wash, and mixed media.

Landscape Architecture**201 Design I: Basic Landscape Architectural Design** Fall. 5 credits. Limited to landscape

architecture majors. Estimated cost of drafting equipment (to be used throughout the 6-studio sequence) and supplies, \$200. Basic expenses for field trip, about \$150.

Lec, M 12:20; studio, M W F 1:25–4:25. Required 5-day field trip. T. H. Johnson.

An introduction to landscape architectural design including design process, site inventory and analysis, basic design principles, and graphic communication. This is the first course in a sequence of six studio courses required for specialization in landscape architecture.

202 Design II: Basic Landscape Architectural Design Spring. 5 credits. Prerequisite: Landscape

Architecture 201. Estimated cost of supplies, \$100.

Lec, F 9:05; studio M W F 10:10–12:35.

M. I. Adleman.

Project planning with emphasis on site design principles and the development of design and graphic skills. Projects deal with the organization of outdoor space and the siting of structures as well as the interrelationships of vehicular and pedestrian circulation, parking, open space, earth form, and vegetation.

220 Principles of Landscape Architecture Fall. 2 credits.

Lecs, M W 9:05. P. J. Trowbridge.

Basic principles involved in observation, analysis, and design methods as they relate to the outdoor environment. Readings and case studies deal with the application of these principles to all scales of land planning and design and include environmental systems, design theory, and American landscape history as applied to the contemporary practice of landscape architecture.

221 Principles of Landscape Architecture Seminar Fall. 1 credit. Prerequisite: concurrent

registration in Landscape Architecture 220. Enrollment limited. Priority given to landscape architecture majors.

Hours to be arranged. P. J. Trowbridge. In-depth discussion of selected topics introduced in Landscape Architecture 220.

224 Plants and Design Fall (1981 only) or spring.

3 credits. Limited to 25 students. Prerequisite: Floriculture 213, 313 or permission of instructor. Basic expenses for field trip about \$55.

Fall: Lec, T 9:05 and R 9:05–11. Spring: Lec, M W F 1:25. Required 2-day field trip.

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; planting considerations in highly dependent landscapes including urban landscape, interior plantscape and roofscape; plans, specifications, and procedures involved in planting implementation.

240 Landscape Design Fall. 3 credits. Limited to 15 students; priority given to landscape horticulture majors. Prerequisite: Floriculture 213 or 313 and permission of instructor.

Lec, M 12:20; studio, M W 1:25–4:25.

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.

301 Design III: Intermediate Landscape

Architectural Design Fall. 5 credits. Prerequisite: Landscape Architecture 202. Cost of supplies about \$100. Basic expenses for field trip, about \$150.

Lec, F 9:05; studio M W F 10:10–12:35. Required 5-day field trip. P. J. Trowbridge.

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.

302 Design IV: Intermediate Landscape

Architectural Design Spring. 5 credits. Prerequisite: Landscape Architecture 301. Cost of supplies about \$100.

Lec, F 12:20; studio M W F 1:25–4:25.

T. H. Johnson.

Design projects focus on the synthesis of conceptual ideas into three-dimensional compositions. Ideas from synectics, organizational systems, activity systems, historic spaces, and sculpture are used to compose hard space, soft space, regional space, and total energy environments.

310 Site Construction I Spring. 4 credits.

Prerequisites: Agricultural Engineering 221 and permission of instructor.

Lecs, M W 9:05; studio, T R 9:05–11.

P. J. Trowbridge.

Lectures, exercises, and projects dealing with land-form design and the preparation of grading plans, calculation of earthwork, and layout of circulation systems, parking, and site utility systems. Required technical material is presented in modules with interim testing for competency in the subject areas.

311 Site Construction II Fall. 4 credits.

Prerequisite: permission of instructor.

Lecs, T R 1:25; studio, T R 2:30–4:25.

T. H. Johnson.

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.

400 Thesis Project Seminar Fall. 1 credit.

Prerequisite: concurrent registration in Landscape Architecture 401.

Sem, W 12:20. P. J. Trowbridge.

Seminar and preparation of program and base material for senior thesis 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 senior thesis project manual as a prerequisite for Landscape Architecture 402.

401 Design V: Advanced Landscape

Architectural Design Fall. 5 credits. Prerequisite: Landscape Architecture 302. Cost of supplies about \$100. Basic expenses for field trip, about \$150.

Lec, M 12:20; studio, M W F 1:25–4:25. Required 5-day field trip. M. I. Adelman.

Application and testing of site planning, planting design, and site construction knowledge and skills. Projects involve design carried to advanced stages of layout, grading, planting, and detailing. Testing includes sketch problems as well as the design and construction sections of the CLARB Uniform National Examination.

402 Design VI: Senior Thesis Project Spring.

5 credits. Prerequisites: Landscape Architecture 400 and Landscape Architecture 401. Cost of supplies and reproductions about \$100.

Lec, F 9:05; studio, M W F 10:10–12:35.

P. J. Trowbridge.

Inventory, analysis, and design methods applied to approved senior thesis project program developed in Landscape Architecture 400. An evaluation of minimum competence in landscape architecture.

431 Introduction to Parks and Recreation Fall. 2 credits.

E. J. Carter.

Park development process and the relationship of park and recreation facilities to urban, suburban, and rural recreation needs; physical and fiscal resources; environmental planning issues; overall municipal development efforts; and the planning and design professions. Lectures, discussions, readings, and short papers.

432 Parks and Recreation Workshop Spring. 2 credits.

E. J. Carter.

Metropolitan park and open space systems; how such systems help to shape our cities and are reflective of the history of attitudes toward recreation, natural systems, and the urban environment; and the role of park and recreation considerations within the comprehensive community planning process. Lectures and case study presentations, discussions, readings, and a workshop project.

435 Urban Environmental Planning Fall. 2 credits.

E. J. Carter.

Theories, principles, and practice of urban environmental planning dealt with in terms of (1) the planning context, (2) environment and ecology, (3) urban form, (4) urban conservation. Readings, discussions, student papers, and case study presentations.

436 Urban Environment Workshop Spring.

2 credits. Prerequisites: Landscape Architecture 435, one or more landscape architecture design studios, and permission of instructor.

E. J. Carter.

Application of the theories, principles, and practice of urban environmental planning to problem solving in actual site situations. Projects emphasize planning process, analysis, programming, and design strategy.

497 (555) 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 (502) Graduate Landscape Architecture

Design Studio Spring. 5 credits. Prerequisite: Landscape Architecture 301.

Lec, M 12:20; studio, M W F 1:25–4:25.

Design exercises focusing on the synthesis of conceptual ideas into three-dimensional compositions. Ideas from synectics, organizational systems, activity systems, historic spaces, and sculptures are used to compose hard space, soft space, regional space, and total energy environments.

***501 Graduate Landscape Architecture Design**

Studio Fall. 5 credits. Prerequisite: Landscape Architecture 500.

L. Mirin.

***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.

L. Mirin.

531 Regional Landscape Inventories and

Information Systems Fall. 3 credits. Prerequisite: permission of instructor.

Lecs, M W F 10:10. A. S. Lieberman.

Reading-seminar course exploring major current methodologies for landscape inventory and analysis, and supporting land-use and natural resource information systems. Case studies in regional landscape planning in North America, Europe, Australia, and the Middle East.

532 Analysis and Use of Vegetation in

Comprehensive Land Planning Spring. 3 credits.

Prerequisite: permission of instructor.

Lecs, M W F 10:10. A. S. Lieberman.

Vegetation analysis techniques and methods applied to comprehensive land-use planning and consideration of the environmental uses of plants in regional landscape planning. Landscape functions of vegetation at the regional scale are addressed through review of case studies in North America, Europe, the Middle East, and Australia.

***621 Summer Internship Seminar** Fall. 2 credits.

L. Mirin.

***622 Graduate Seminar in Landscape**

Architecture Spring. 2 credits.

T. H. Johnson.

***650 Fieldwork or Workshop in Landscape**

Architecture Fall or spring. 1–5 credits. S-U grades optional.

L. Mirin.

800 Thesis Research and Preparation in

Landscape Architecture Fall or spring. 9 credits.

Limited to M.L.A. degree candidates. Prerequisite: permission of graduate field members concerned.

Staff.

Independent research under faculty guidance leading to the development of an original, comprehensive, and defensible design or study related to the field of landscape architecture.

Food Science

J. E. Kinsella, chairman; J. G. Babish, R. C. Baker, D. K. Bandler, D. M. Barbano, D. H. Beermann, D. C. Graham, R. B. Gravani, L. F. Hood, J. H. Hotchkiss, W. K. Jordan, F. V. Kosikowski, R. A. Ledford, F. W. Liu, R. P. March, D. D. Miller, N. N. Potter, J. M. Regenstein, G. E. Rehkugler, S. S. H. Rizvi, J. W. Sherbon, W. F. Shippe, Jr., J. R. Stouffer, G. H. Wellington, R. R. Zall

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

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, staff, and invited speakers.

A series of lectures dealing with current topics relating to foods. Attempts are made to dispel misconceptions about foods and the factors affecting them.

210 Food Analysis Spring. 3 credits. Prerequisite: Chemistry 104 or 208.

Lecs, W F 12:20; lab, F 1:25–4:25 or M 7:30–10:30 p.m. J. W. Sherbon.

Designed to acquaint the student with chemical tests used by food analysts. Emphasis is on understanding and use of good analytical techniques, including gravimetric, volumetric, and spectrophotometric methods. Procedures for screening, routine quality control, and official tests for fats, proteins, carbohydrates, and selected minor nutrients are introduced.

220 Food Science for Industry Fall. 2 credits.

Lec and lab, F 12:20–4:25. Field trips. R. C. Baker. Provides understanding of food industry operations. Half the labs are production of food products (such as sausages and pastries) by students and half are visits to commercial plants producing those products. One or two longer field trips may be offered.

247 Postharvest Food Systems Fall. 2 credits.

Prerequisite: freshman chemistry. Recommended: Food Sciences 100. S-U grades optional.

T R 10:10. M. C. Bourne.

This interdisciplinary course describes various courses of postharvest food losses in developing countries and methods available to reduce the losses. Designed for all students in agriculture. Emphasis on cereal grains. Biology and control of rodents, birds, insects, and molds in stored foods, chemical causes of quality loss, simple drying and storage practices, effects of climate. Economic and social factors affecting food preservation and storage technology are discussed.

300 Physical Chemistry of Foods Fall. 3 credits.

Prerequisite: Mathematics 111 or equivalent.

Lecs, M W 11:15; disc, F 12:30–2:15 or 2:30–4:15. S. S. H. Rizvi.

An introduction to the principles of molecular structure, energetics, and kinetics is offered, with applications of these principles to food systems and similar biological materials. Topics include thermodynamics, properties of solutions, phase equilibria, reaction mechanisms, and transport phenomena.

301 Nutritional Aspects of Raw and Processed Foods (also Nutritional Sciences 301) Spring.

3 credits. Prerequisite: Nutritional Sciences 115, 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 including food

processing methods, dietary trends, vegetarian diets, fabricated foods, fast foods, and food additives are discussed in the context of their potential impact on nutrition and health.

302: Introduction to Food Engineering Fall.

4 credits. Prerequisites: Food Science 100 and physics.

Lecs, M W F 10:10; lab, M 1:25–4:25. W. K. Jordan. Engineering aspects of dairy and food plant operations.

304 Food Sanitation As Related to Public Health

Spring. 3 credits. Prerequisite: Food Science 100.

Lecs, T R 10:10; lab, R 1:25. R. R. Zall.

Deals with the sanitary principles and control measures essential in producing and processing wholesome and safe foods. Rules and regulations of the U.S. Public Health Service, the Food and Drug Administration, the U.S. Department of Agriculture, and other organizations important to the food industry are covered.

311 Milk and Frozen Desserts Fall. 2 credits.

Prerequisite: Food Science 100 or equivalent or permission of instructor. Offered alternate years.

Lec, W 12:20; lab, W 1:25. W. K. Jordan, R. R. Zall. Deals with the principles and practices of processing fluid milk products and frozen desserts. The chemical, microbiological, and technological aspects of processing these dairy products are considered. Field trips to processing plants supplement the lectures and laboratory work.

351 Milk Quality Spring. 1 credit. Prerequisite:

Animal Science 350 (may be taken concurrently) or permission of instructor.

Lec, F 12:20. D. K. Bandler, R. R. Zall. Aspects of farm sanitation and milk handling as they apply to milk quality. Quality control tests, farm bacteriology, cleaning, and sanitizing. Special problems of marketing fresh and manufactured 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.

M W 10:10.

A discussion of the sequence of events involved 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.

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 1981–82.

Lecs, T R 11:15; disc, R 1:25–4:25.

F. V. Kosikowski.

A critical evaluation of man's needs for food in the world and the international food technologies, organizations, and policies to meet such needs. Novel extrusion, ultrafiltration, and fermentation food processes and basic nutrient foods for developing countries are described. The making of representative high energy and protein foods, including soybean milk, tofu, sufu and tempeh is demonstrated in the laboratory.]

404 Food Processing I—Drying, Freezing, Heat**Preservation** Spring. 3 credits. Prerequisite: Food Science 100 or equivalent. Offered alternate years.

Lecs, T R 11:15; lab, T 1:25–4:25. N. N. Potter.

Deals with the principles and practices of drying, freezing, canning, and other heat treatments applied to foods. Current processing methods and their relations to the chemistry, microbiology and technology of the ingredients and final products are discussed.

[405 Food Processing II—Concentrating, Separating, Mixing Spring. 3 credits. Prerequisites:

302 and Microbiology 290 and 291. Offered alternate years. Not offered 1981–82.

Lecs, T R 11:15; lab, T 1:25–4:25. W. K. Jordan, R. R. Zall.

Deals with the principles and practices of evaporation, reverse osmosis, homogenization, size reduction, waste management, and other unit operations important to the food industry.]

406 Food Processing III Lecture—Fermentations

Fall. 3 credits. Prerequisite: background in microbiology. Offered alternate years.

Lecs, T R 11:15; disc, R 1:25–4:25.

F. V. Kosikowski.

Principles and practices of viniculture and enology, cheese technology, and related fermentations leading to important foods from fruits, grains, vegetables and milk, animal, and microbial sources. Taste evaluations and illustrated descriptions of wines, beers, cheeses, fermented milks, and exotic fermented foods are included.

407 Processing Fats and Oils Fall. 3 credits.

Offered alternate years.

Lecs, W F 9:05; lab, F 1:25–4:25. J. E. Kinsella.

Sources, composition, and properties of edible fats and oils are discussed. Effects of lipids on food quality and storage stability and factors affecting chemical and physical stability of food fats are described. Chemical technology of emulsions, shortenings, edible oils, margarine, and butter is taught.

408 Food Processing Fermentations Laboratory

Fall. 2 credits. Enrollment limited. Prerequisite: concurrent registration in Food Science 406. Offered alternate years.

Lab, T 1:25–4:25. Required short field trips.

F. V. Kosikowski.

Laboratory exercises and demonstrations in the making of wines, beers, cheeses, fermented milks, and vegetable foods. Field trips provide 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.

Deals with the relationship between the chemical composition and properties of foods. Attention is given to the interactions among the components of food.

410 Sensory and Objective Evaluations of Foods Spring. 3 credits. Prerequisite: statistics.

Lecs, M W F 11:15. W. F. Shipe.

Deals with the sensory techniques used in evaluating

the flavor, color, and texture of foods and the effects of these properties on consumer acceptance. Objective methods for measuring these qualities and appropriate statistical methods for analyzing the subjective and objective results and establishing a quality-control program.

[411 Food Mycology] Fall 3 credits. Prerequisite: Microbiology 290 or 291 or equivalent. Recommended: Microbiology 394. Offered alternate years. Not offered 1981-82.

Lecs, T R 10:10; lab, W 1:25-4:25. D. C. Graham. To acquaint students with important fungi, from the standpoint of their beneficial as well as their harmful effects in food production, preservation, and spoilage. Labs 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.

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.

Lecs, M W F 9:05. J. H. Hotchkiss. Intended primarily for students in food science and related fields. The basic properties of some packaging materials and systems are discussed and applied to specific packaging systems for meats, dairy products, fruits and vegetables, fats and oils, et cetera.

[419 Food Chemistry Laboratory] Fall. 2 credits. Prerequisites: Biological Sciences 330 or 331 and concurrent registration in Food Science 409.

Lab, T 1:25-4:25. D. Miller. Intended to complement Food 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 are stressed.

[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. 2 credits. 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.

Hours to be arranged. Staff. Independent study.

[600 Seminar] Fall or spring. 1 credit. Required of all food science graduate students. S-U grades only.

[601 Food Protein Chemistry] Fall. 3 credits. Limited to graduate students and to seniors with permission of the instructor. Prerequisite: Food Science 300 or its equivalent. Students who have already had Biological Sciences 631 may not take this course for credit. Offered alternate years.

Lec, M W F 10:10. J. M. Regenstien. 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.

[602 Food Lipids] Spring. 2 credits. Limited to graduate students. Offered alternate years. Not offered 1981-82.

T R 12:20. J. E. Kinsella. Disposition of lipid materials in foods and how lipids influence the chemical and physical attributes of various foods. Effects of storage, heating, refrigeration, and enzymes on food lipids and the chemical mechanisms of oxidation. Importance of lipids to food flavors.]

[603 Food Carbohydrates] Spring. 2 credits. Limited to qualified seniors and graduate students. Prerequisite: Biological Sciences 330 or equivalent. Offered alternate years.

Lecs, T R 10:10 L. F. Hood, R. S. Shallenberger. A consideration of the chemistry of carbohydrates in foods including sugars, starches, pectins, gums, and cellulose. Emphasis is on their intrinsic chemistry, their origins in raw materials, and the subsequent changes occurring during processing and storage.

[604 Chemistry of Dairy Products] Fall. 2 credits. Prerequisites: qualitative and quantitative analysis and organic chemistry. Offered alternate years. Not offered 1981-82.

Lecs, T R 12:20. D. M. Barbano. A study of milk constituents and physical properties. Deals with milk enzymes, lactose, milk fat, milk proteins, and minor constituents and includes biological variations and processing effects.]

[606 Instrumental Methods] Fall. 5 credits.

Prerequisite: permission of instructor. Lec, M W F 8; lab, W or R 1:25-4:25. J. W. Sherbon.

Deals with instrumental methods widely used in research and industry. The major emphasis is on chromatography, spectroscopy, electrophoresis, thermal analysis, and the use of computers. The stress is on the theoretical and practical aspects of the material presented.

[608 Food Color and Food Pigments] Fall. 1 credit.

Prerequisite: organic chemistry. Offered alternate years. Lec, F 12:20. J. P. VanBuren. An introduction to theories of color perception and color spaces, followed by a survey of chemical and physical properties of the major food pigments and their stability during processing and storage. Color and pigments of selected commodities are examined.

[609 Rheology] Fall. 1 credit. Offered alternate years.

Lec, T 12:20. M. C. Bourne. Fundamental concepts of rheology applied to foods, with emphasis on objective methods for measuring textural properties. Principles and practice involved in measuring texture, viscosity, texture profiling, and consistency; instrumentation and correlations between objective and sensory methods of texture measurements. Examples of rheological problems in each major food group.

[610 Introductory Chemical Toxicology] Fall. 2 credits. Prerequisites: biochemistry and animal physiology.

Lec, F 11:15. J. B. Babish, D. K. Lisk, G. S. Stoewsand. An introduction to the concepts and essentials of toxicology, especially as related to foods; physiologically active compounds in natural and processed foods; antinutritive substances; intentional food additives; potential contaminants; safety evaluation and regulation of foods. Writing or a brief student lecture is assigned, to widen knowledge of current research.

[614 Mathematical Evaluation of Processed Packaged Foods] Spring. 3 credits. Offered alternate years.

Lec and disc, R 2-4:25. Mathematical methods used to evaluate the thermal processing of packaged foods are presented in depth. These techniques are used in predicting shelf life and nutrient loss.

[615 Secondary Plant Metabolites in Foods] Fall. 1 credit. Prerequisite: Biological Sciences 330 or 331. Offered alternate years. Not offered 1981-82.

Lec, F 12:20. G. Hrazdina. Deals with the biochemistry of secondary plant metabolites (e.g., sulphur-containing compounds, alkaloids, flavonoids, terpenes) and their importance to food products. Emphasis is on the chemical properties of these compounds, their reactions, their occurrence in edible plants, and their influence on food products.]

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 392)

Advanced General Microbiology Lectures (Microbiology 390)

Postharvest Handling and Marketing of Vegetables (Vegetable Crops 312)

International Agriculture

[300 Perspectives in International Agriculture and Rural Development] Fall. 2 credits. S-U grades optional.

F 1:25-3:20. Staff. A forum to discuss both contemporary and future world food issues and the need for an integrated, multidisciplinary team approach in helping farmers and rural development planners adjust to the ever changing food needs of the world.

[599 Seminar: International Agriculture] Fall and spring. Noncredit. S-U grades only. Third and fourth Wednesdays 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.

[601 Agricultural Development in Southeast Asia] Spring. 2 credits. S-U grades optional.

F. H. Golay, G. Levine, R. Barker. Major aspects of agricultural development in Southeast Asia are considered from economic, social, and technological points of view.]

[602 Special Studies of Problems of Agriculture in the Tropics] Spring. 3 credits. Prerequisites: an international agriculture course and permission of instructors. Cost of field-study trip, \$400 for lodging, meals, personal expenses, and a portion of transportation.

R 2:30-4:25. Staff.

Oriented to provide students an opportunity to observe agricultural development in a tropical environment and promote interdisciplinary exchange among staff and students. The two-week field-study trip during January to Latin American countries is followed by discussions and assignments dealing with problems in agriculture and livestock production in the context of social and economic conditions.

603 Administration of Agricultural and Rural Development (also Government 692 and B&PA NCE 514) Spring. 3 credits. S-U grades optional.

T 2:30–5:30. M. L. Barnett, J. L. Compton, M. J. Esmen, 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. M 1:25–3:20. Staff.

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, improving livestock production, strategies for improving human nutrition, food storage and mechanization, rural employment projects, alternative rural development strategies, and experience with World Bank and other internationally funded rural development projects.]

605 Chinese Agricultural and Rural Development Fall. 3 credits. S-U grades optional.

T R 12:20–2:15. M. L. Barnett, R. Barker, R. Sinha.

A multidisciplinary seminar dealing with the economic, social and technical aspects of agricultural modernization in China. The course will explore changing strategies for agricultural and rural development and review the China experience against developmental efforts in other countries.

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.

899 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.

Related Courses in Other Departments

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)

Microeconomic Issues in Agricultural Development (Agricultural Economics 664)

Seminar on Latin American Agricultural Policy (Agricultural Economics 665)

Seminar in Agricultural Development (Agricultural Economics 666)

[Seminar on Agricultural Trade Policy (Agricultural Economics 730)] Not offered 1981–82.]

Export Marketing (Agricultural Economics 743)

Production of Tropical Crops (Agronomy 314)

Geography and Appraisal of Soils of the Tropics (Agronomy 401)

Management Systems for Tropical Soils (Agronomy 480)

Livestock Production in Warm Climates (Animal Science 400)

Forages of the Tropics for Livestock Production (Animal Science 403)

[Seminar in Science and Technology Policy in Developing Nations (City and Regional Planning 771)] Not offered 1981–82.]

Seminar in Policy Planning in Developing Nations: Technology Transfer and Adaptation (City and Regional Planning 772)

Seminar in Project Planning in Developing Countries (City and Regional Planning 773)

Intercultural Communication (Communication Arts 601)

Communication in the Developing Nations (Communication Arts 624)

Designing Extension and Continuing Education Programs (Education 624)

Behavioral Change in International Rural Modernization (Education 627)

Community Education (Education 628)

Comparative Extension Education (Education 629)

Postharvest Food Systems (Food Science 247)

[International Food Sciences and Development (Food Science 403)] Not offered 1981–82.]

Political Economy of Change: Rural Development in the Third World (Government 648)

Regional Landscape Inventories and Information Systems: An International Perspective (Landscape Architecture 531)

Analysis and Use of Vegetation in Comprehensive Land Planning (Landscape Architecture 532)

National and International Food Economics (Nutritional Sciences 457)

International Nutrition Problems, Policy, and Programs (Nutritional Sciences 680)

Seminar in International Nutrition and Development Policy (Nutritional Sciences 695)

Special Topics in International Nutrition (Nutritional Sciences 699)

Plant Diseases in Tropical Agricultural Development (Plant Pathology 655)

Economic Fruits of the World (Pomology 206)

Rural Sociology and World Development Problems (Rural Sociology 105)

Rural Development and Cultural Change (Rural Sociology 355)

Subsistence Agriculture in Transition (Rural Sociology 357)

Rural Social Stratification (Rural Sociology 445)

Contemporary Sociological Theories of Development (Rural Sociology 606)

Social Organization of Agriculture (Rural Sociology 650)

[Macrosocial Accounting (Rural Sociology 715)] Not offered 1981–82.]

[Social Movements in Agrarian Society (Rural Sociology 723)] Not offered 1981–82.]

[Applications of Sociology to Development Programs (Rural Sociology 751)] Not offered 1981–82.]

Sociotechnical Aspects of Irrigation (Rural Sociology 754)

Landscape Architecture

M. I. Adleman, program coordinator

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. See pages 52 and 83.

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

100 Microbes and Human Affairs Spring. 3 credits.

M W F 11:15. S. H. Zinder. Development of microbiology as a science. Basic characteristics of microorganisms. Importance of microorganisms in medicine, environment, agriculture, and industry. Recent advances in microbial technology, including genetic engineering.

290 General Microbiology Lectures Fall or spring. 3 credits. Prerequisites: Biological Sciences 101–102 and Chemistry 104 or 208. Recommended: concurrent registration in Microbiology 291.

M W F 11:15. Evening exam: spring, March 2, April 8, and April 22. Fall, W. C. Ghiorse; spring, P. J. VanDemark.

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. Prerequisite: Microbiology 290 (may be taken concurrently).

M W 2–4:25 or 7–9:30 p.m. 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 are considered.

336 Applied and Industrial Microbiology

Fall. 3 credits. Prerequisites: Microbiology 290 and organic chemistry.

T R 10:10–11:25. E. A. Delwiche, N. C. Dondero, and staff.

A survey of the microbiology of industrial fermentations and public health aspects of water and wastewater.

390 Advanced General Microbiology Lectures

Fall. 2 credits. Prerequisites: Microbiology 290 and 291 and organic chemistry. May be taken independently of Microbiology 391 and in sequence with or independently of Microbiology 392. Offered alternate years.

M W 11:15. E. A. Delwiche, N. C. Dondero.

A consideration of the morphological, taxonomic, cultural, and physiological characteristics of important groups of heterotrophic microorganisms. Included will be (1) spore-forming bacteria, propionic acid bacteria, and gram-negative cocci and (2) pseudomonads, enterics, and related forms.

391 Advanced General Microbiology Laboratory

Fall. 2 credits. Limited to 20 students. Prerequisite: Microbiology 390 (may be taken concurrently). Offered alternate years.

M W 2–4:25. E. A. Delwiche, N. C. Dondero.

Intended as a lab complement to Microbiology 390. The isolation, characterization, and study of the groups of heterotrophic microorganisms included in Microbiology 390.

[392 Advanced General Microbiology Lectures

Fall. 2 credits. Prerequisites: Microbiology 290 and 291 and organic chemistry. May be taken independently of Microbiology 393 and in sequence with or independently of Microbiology 390. Offered alternate years. Not offered 1981–82.

M W 11:15. P. J. VanDemark, E. P. Greenberg.

A consideration of the morphological, taxonomic, cultural, and physiological characteristics of important groups of heterotrophic microorganisms. Included are (1) lactic acid bacteria and (2) marine bacteria, thermophilic bacteria, and halophilic and halotolerant bacteria.]

[393 Advanced General Microbiology Laboratory

Fall. 2 credits. Limited to 20 students. Prerequisite: Microbiology 392 (may be taken concurrently). Offered alternate years. Not offered 1981–82.

M W 2–4:25. P. J. VanDemark, E. P. Greenberg.

Intended as a lab complement to Microbiology 392. The isolation, characterization, and study of the groups of heterotrophic microorganisms included in Microbiology 392.]

422 Aquatic Microbiology

Spring. 3 credits. Prerequisites: Microbiology 290 or Agronomy 406, and organic chemistry.

T R 10:10–11:25. *Sabbatical Spring 1982.

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.

[424 Microbial Ecology

Spring. 3 credits. Prerequisite: an elementary course in some facet of microbiology. Offered alternate years. Not offered 1981–82.

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. Particular consideration is given to the dynamics of growth, the nutrition and energy metabolism of developing cultures, and the interactions of the physical and chemical environments with the growth process. Composition and structure of microorganisms, metabolism, and various microbial processes such as transport and regulation are discussed.

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 lab component of Microbiology 480. Experiments designed by the instructor and students to explore fundamental concepts, techniques, and instrumentation in microbial physiology.

484 Cytology of Prokaryotes Lectures

Spring. 3 credits. Prerequisites: Microbiology 290 and 291, biochemistry. S-U grades optional. Offered alternate years.

M W F 9:05. W. C. Ghiorse.

An in-depth survey of morphology and life cycles of prokaryotic organisms. Form, organization, and function are considered with respect to aggregates of cells, individual cells, sub-cellular organelles, and macromolecular architecture.

485 Cytology of Prokaryotes Laboratory

Spring. 2 credits. Enrollment limited. Prerequisite: concurrent registration in Microbiology 484 and permission of instructor. Offered alternate years.

Hours to be arranged. W. C. Ghiorse.

Cytological techniques, including preparations for light and electron microscopy, that are especially applicable to the study of prokaryotic cells.

486 Selected Topics in Microbial Metabolism

Spring. 2 credits. Primarily for upperclass and graduate students. Prerequisites: beginning courses in general microbiology, biochemistry, and organic chemistry. S-U grades optional.

T R 11:15. E. A. Delwiche.

Selected topics pertaining to the energy metabolism, oxidative and fermentative abilities, and biosynthetic capacities of microorganisms. Where possible and appropriate, the subject matter compares the various microbial forms.

497 Special Topics

Fall. 1 credit. Limited to upperclass students specializing in microbiology, who may desire to take Microbiology 499. Prerequisite: permission of instructor. S-U grades only. The course cannot be used to fulfill the specialization requirement.

Hours to be arranged. Staff.

498 Teaching Experience

Fall or spring. 1–3 credits. Enrollment limited. Prerequisites: previous enrollment in the course to be taught or equivalent, and written permission of instructor. S-U grades option with permission of instructor.

Hours to be arranged. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and teaching microbiology courses under supervision of departmental faculty. This experience may include leading a discussion group, preparing, assisting, or teaching a microbiology laboratory, or tutoring. Microbiology courses currently offering such experience include 291 and 292. This course cannot be used to fulfill the specialization requirement.

499 Research in Microbiology

Fall or spring. Variable credit. Undergraduates must attach to their course enrollment material written permission of the staff member who will supervise the work and assign the grade. This course cannot be used to fulfill the specialization requirement.

Hours to be arranged. Staff.

691 Graduate Seminar in Microbiology

Fall and spring. 1 credit each semester. All graduate students majoring in microbiology must enroll each semester.

Hours to be arranged. Staff.

694 Bacterial Diversity

Spring. 4 credits. Prerequisites: either Microbiology 390, 392, or 480, and Biological Sciences 330 or 331 or equivalent.

M W 12:20–4:25. E. P. Greenberg.

Physiology, ecology, and morphology of selected groups of bacteria, including the methanogenic bacteria, spirochetes, nitrogen-fixing bacteria, photosynthetic bacteria, thermophilic bacteria, myxobacteria, and others. Behavior of bacteria in response to environmental stimuli.

699 Microbiology Seminar

Fall and spring. Required of all graduate students majoring in microbiology and open to all who are interested.

Hours to be arranged. Staff.

Related Courses in Other Departments

Soil Microbiology (Agronomy 406)

Advanced Soil Microbiology (Agronomy 606)

Insect Pathology (Entomology 453)

Food Microbiology Lectures (Food Science 394)

Food Microbiology Laboratory (Food Science 395)

Food Mycology (Food Science 411)

Basic Immunology, Lectures (Veterinary Medicine 315)

Basic Immunology, Laboratory (Veterinary Medicine 316)

Pathogenic Microbiology (Veterinary Medicine 317)

Microbial Genetics, Lectures (Biological Sciences 485)

Microbial Genetics, Laboratory (Biological Sciences 486)

[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)

Natural Resources

W. H. Everhart, chairman; R. A. Baer, H. B. Brumsted, J. W. Caslick, T. A. Gavin, S. P. Gloss, E. E. Hardy, R. A. Howard, T. L. Hullar, J. W. Kelley, J. P. Lassoie, R. J. McNeil, R. A. Malecki, A. N. Moen, R. R. Morrow, Jr., R. T. Oglesby, M. E. Richmond, C. L. Schofield, D. A. Webster, B. T. Wilkins, W. D. Youngs

200 Principles of Conservation Fall. 3 credits. Limited to natural resources majors. Not open to students who have passed Natural Resources 201. Lec, M W F 10:10; 1-hour disc to be arranged. R. J. McNeil.

Principles of environmental conservation and application of those principles to the management of natural resources. Ecological concepts, a survey of the natural resources and their properties, and resource management concepts are considered. Social, political, legal, economic, and ethical aspects of environmental issues are discussed.

201 Environmental Conservation Spring. 3 credits. A survey course intended for students in any year and major. Not open to students who have passed Natural Resources 200. Lec, M W F 10:10; R. J. McNeil.

People, natural resources, and environment. Ecological principles as applied to human use of environment; survival strategies of animals and the application of these concepts to human use and misuse of environment; a survey of natural resources and problems related to their management. Current issues such as air and water pollution, disposal of radioactive wastes, human population pressures, energy supply and management, and life-style are considered. Social, political, legal, economic, and ethical aspects of environmental concerns are introduced.

210 Introductory Field Biology Fall. 3 credits. Class size limited to 45. Preference given to sophomores and transfer students in Natural Resources. Prerequisites: Biological Sciences 101 and 102 or equivalent. Cost of field trips, no more than \$10.00.

Lec, W 10:10; labs, M W 1:25–4:25. 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, to include common and scientific names as well as basic life history attributes, are expected. Selected aspects of current ecological thinking, relevant to problems in assessment of the distribution and abundance of organisms, are stressed. The interaction of students with biological events in the field and accurate recording of these events are emphasized.

250 Introductory Wildlife Biology Spring; first third of term. 1 credit. Prerequisites: Natural Resources 210 or permission of instructor.

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; middle third of term. 1 credit. Prerequisites: Natural Resources 210 or permission of instructor.

Lec, M W F 8. Staff. Importance of basic life history, ecology, and measurable parameters as a bases for fishery management. Representative commercial and recreational fisheries will be used as examples.

252 Introductory Forestry Spring; last third of term. 1 credit. Prerequisites: Natural Resources 210 or permission of instructor.

Lec, M W F 8. Field trip: All day one S. R. R. Morrow.

Appreciation of forests as a natural resource. Importance of ecology and measurement as bases for forest management. Introduction to tree biology and silviculture.

260 Introduction to Consumptive Wildlife

Recreation Fall (3 weeks only). 1 credit. Class size limited to 15. Prerequisites: Natural Resource majors or permission of instructor. Cost of overnight field trip, no more than \$5.

Lec, M W 7:30 p.m.–10 p.m. Overnight field trip. R. A. Howard.

Brief history of trapping and hunting; role of consumptive recreationists in conservation; firearms and archery nomenclature, function, ballistics, and safety; content of N.Y.S. hunter training, bowhunter education, and trapper training courses; discussion of current methods, laws, ethics; basic shooting instruction with rifles and shotguns; field exercise at Arnot Forest.

300 Natural Resources Inventories Spring. 3 credits.

Lec, M W 12:20; lab, M T W 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 are undertaken. Land resource inventories are emphasized.

302 Forest Ecology Fall. 3 credits. Limited to seniors and graduate students. Cost of trip, no more than \$20.

Lec, M W 11:15; lab, M 1:25–4:25. 1 weekend trip. S through M. M. P. Hamilton.

Understanding the wildland environment. Development of ability to identify and analyze what is present, what was present, what is likely to happen in various forest ecosystems. All laboratory sessions in the field. One required weekend trip to the Adirondacks or other major forest region.

303 Woodland Management Fall. 3 credits. S-U grades optional.

Lec, T R 11:15; lab, R 1:25–4:25 (1 field trip will end at 5:30). Evening prelim: T Oct. 6.

R. R. Morrow. Designed to give the student the basic information necessary to permit sound woodland management decisions. Field trips to woodlots emphasize variations in value and potential as well as biological growth. Introduction to tree identification, log scaling, timber estimating, tree marking, and stand improvement work. Planting management, harvesting, marketing, and multiple use are discussed, as well as relationships of forestry to people and to the environment.

305 Maple Sirup Production Spring. 1 credit. S-U grades only. Limited to 20 students. Prerequisite: permission of instructor.

T 12:20–4:25 (4 preliminary seminars, followed by several half-days of fieldwork during the maple season). R. R. Morrow, A. Fontana.

Students work in most phases of the Arnot Forest maple operation and learn modern sap collecting techniques and quality control in making sirup. A 100-tap area is reserved for student installation of a tubing sap collection network.

320 Winter Energetics Spring. 1 credit. Prerequisites: 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.

330 Ecological Integration

Summer or fall. 4 credits. Prerequisites: Natural Resources 250 or permission of instructor.

Lec, lab, and disc, all day M T W R F in residence at Arnot Forest. A. N. Moen.

Measurements and analyses of weather, watershed, plant community, and animal population characteristics in an integrated ecological way, stressing interrelationships within ecosystems. This course will be held at the Arnot Forest during the three-week summer session beginning the week after commencement.

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. Staff. A study of the effects of Western religion and values on our understanding and treatment of nature. Historical overview, followed by consideration of selected themes, including progress, play and work, objectivity and subjectivity, human finitude and death, and knowledge as control. Also responsibility to future generations; limiting growth and questions of distributive justice; world population and global hunger; implications of environmental programs for minorities, the poor, and other nations; land use; and energy policy.

410 Principles of Wildlife Management

Fall. 4 credits. Class size limited to 36. Preference given to seniors in Natural Resources. Prerequisites: Natural Resources 210 and Biological Sciences 360, or permission of instructor. Cost of field trips, no more than \$8.

Lec, M W F 11:15; lab, F 1:25–4:25. One weekend field trip required. T. A. Gavin.

Stresses the application of ecological, behavioral, and genetic principles to management of wild vertebrate populations. Encourages student development of a theoretical-biological framework on which to base management decisions. Provides students with a sense of the history of wildlife management in North America and a feeling for its future.

411 Techniques in Wildlife Science

Spring. 2 credits. Prerequisite: Natural Resources 410 or permission of instructor.

Lec, F 11:15; lab, F 1:25–4:25. J. W. Caslick. An introduction to techniques used in wildlife research and management, with emphasis on field methods and northeastern game species.

414 Selected Topics in Wildlife Resource Policy

Spring. 2 credits. Intended for juniors and seniors. Prerequisite: Natural Resources 410 or equivalent or permission of instructor. S-U grades optional. Cost of field trips, no more than \$25.

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.

430 Dynamics of Animal Populations

Spring. 2 credits. For seniors and graduate students in natural resources; others by permission of instructor. Offered alternate years.

T R 10:10. W. D. Youngs. A quantitative examination of the dynamics of animal populations. Interactive computing is used to assist in analysis and understanding of mortality, growth, population estimation, and population interaction.

438 Fishery Resource Management

Spring. 3 credits. Prerequisite: Natural Resources 440 or permission of instructor.

Lec, T R 8. W. H. Everhart. Principles and problems in the management of freshwater and marine fishery resources, considered in relation to problems of human population and management of other natural resources.

[440 Fishery Science] Fall, 3 credits. For seniors majoring in fishery science; others by permission of instructor. Prerequisites: a year of statistics and calculus. Offered alternate years. Not offered 1981-82.

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.
D. A. Webster.

Emphasis is on methods of collecting fish and related data when information on population dynamics is of paramount importance. Labs include field experience in use of gear and instruments. Opportunities for additional experience in ongoing college fishery research program is provided.

443 Managing the Aquatic Environment Fall.
2 credits. Limited to 30 juniors and seniors not majoring in aquatic science.

Lecs, T R 10:10; S field trip. R. T. Oglesby.
The nature of aquatic environments and effects of humans on them are initial foci. Wise use of aquatic resources is surveyed in terms of human impacts on them, including the introduction of toxicants and nutrients, removal or addition of particular biotic components, and modifications of the physical environment. Emphasis is on lakes, rivers, and estuaries.

490 Practicum in Natural Resources Analysis and Management Fall. 5 credits. For seniors in natural resources; others by permission of instructors.
Hours to be arranged. Staff.

An in-depth exercise in planning the management of selected resources in a defined geographic area. Students work in groups under the supervision of a faculty committee with other faculty members acting as consulting experts. Student groups make oral and written reports on their management plans to a client panel of faculty members and outside evaluators.

493 (498) Research in Resource Analysis and Planning Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional.

R. A. Baer, H. B. Brumsted, E. E. Hardy, T. L. Hullar, J. W. Kelley, R. J. McNeil, B. T. Wilkins.

494 Research in Fishery Science Fall or spring. Credit to be arranged. S-U grades optional.
Hours to be arranged. J. L. Forney, S. P. Gloss, R. T. Oglesby, C. L. Schofield, D. A. Webster, W. D. Youngs.

495 Research in Wildlife Science Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional.
H. B. Brumsted, J. W. Caslick, T. A. Gavin, R. A. Howard, R. A. Malecki, A. N. Moen, M. E. Richmond.

496 Research in Forestry Fall or spring. Credit to be arranged. S-U grades; letter grade by permission of instructor.
Hours to be arranged. J. P. Lassoie, R. R. Morrow, 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.

[600 Waterfowl Biology] Fall, 3 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1981-82.
Lec-labs, T R 1:25-3:50; several field trips.
R. A. Malecki.

An introduction to waterfowl and selected webless migrants. Emphasis is on the waterfowl resource in North America; identification of species, their ecological relationships, population dynamics, and management.]

601 Seminar on Selected Topics in Fishery Biology Fall or spring. 1 credit.
Hours to be arranged. Staff.

602 Seminar in Natural Resource Analysis for Ecologically Based Planning Spring. 2 credits. S-U grades only.
W 2-4:30. 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 ecotone are addressed from the standpoint of island biogeographic principles, structural and spatial heterogeneity of the vegetation, community productivity and temporal change. Major land forms and plant-animal communities of the northeastern United States will be visited during weekend field trips. Paper required for 3-credit option.

604 Seminar on Selected Topics in Resource Policy and Planning Fall. 1 credit. S-U grades only.
Hours to be arranged. Staff.
Primarily for graduate students majoring or minoring in natural resources conservation.

605 Ecology and Management of Disturbed Aquatic Systems Spring. 3 credits. Limited to 20 seniors and graduate students. Recommended for students specializing in the aquatic sciences. Prerequisite: limnology or oceanography. Offered alternate years.
Lecs, T R 10:10; disc, W or F 1:25-3:25; at least 1 S field exercise. R. T. Oglesby.

Lectures and readings focus on responses of aquatic ecosystems to stress and on significance of such reactions. Methods and strategies of management to minimize undesirable aspects of human activities are considered. Detailed case histories are studied and discussed.

[606 Marine Resources Policies] Spring. 2 credits. Prerequisite: at least one related course such as Biological Sciences 364, 666, or 668, Natural Resources 438, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1981-82.
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 Perspectives on Conservation Spring. 3 credits. For graduate students; others by written permission of instructor. S-U grades for graduate students. Not offered 1981-82.
R 1:25-3:30. B. T. Wilkins.

A seminar based on extensive readings of articles highlighting varying philosophical approaches to the conservation of natural resources. Views espoused by developmentalists, preservationists, naturalists, economists, and welfare economists are considered.

608 Policies and Management of Natural and Wild Lands Fall. 2 or 3 credits (required field trip for 3-credit option). Prerequisite: permission of instructor. S-U grades optional.

Lec, T 9-11. T. L. Hullar.
Lectures, discussions, special seminars, readings, and case studies on natural and wild lands, particularly those in public ownership. Major topics include the values of these lands, social and scientific basis for their establishment, analysis of the policies for preservation and use, and methods and strategies for management. National and state wilderness systems, social and biological carrying capacity, effects of special interests, and current issues are covered. An independent study of a selected area is required.

609 Effects of Ecological Perturbations on Fishes Spring. 3 credits. Prerequisites: 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. Noncredit. 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 \$14. Not offered 1981-82.

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) the role of nonutilitarian values in our relationship to our natural environment, (2) land ethics, (3) new models for higher education in the age of ecology, and (4) concepts of growth and progress in Western culture and their impact on our treatment of the environment.]

612 Wildlife Science Seminar Fall and spring. 1 credit. Prerequisite: permission of instructor. S-U grades optional.
Hours to be arranged. Staff.
Discussion of individual research or current problems in wildlife science.

[614 Ecology and Management of Wetlands] Fall. 3 credits. Limited to upper division and graduate students majoring in natural resources or biological sciences. Prerequisite: permission of instructor. Cost of field trips, no more than \$25. Offered alternate years. Not offered 1981-82.

Lec-Labs, T R 1:25-3:50. R. A. Malecki.
Lectures, readings, and field trips designed to develop an understanding and appreciation of freshwater and coastal wetlands; their function, classification, plant and animal associations, regulation, and management. Major wetland types in the northeastern United States are visited during 1 or 2 weekend field trips. Independent study of a selected area is required.]

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)****Evaluating Resource Investment and Environmental Quality (Agricultural Economics 450)****Image Analysis (Aerial Photo Interpretation) (Engineering CEE A687)****Insect Biology (Entomology 212)****Introduction to Environmental Pollution (Agricultural Engineering 325)****Limnology (Biological Sciences 462)****Mammalogy (Biological Sciences 471)****Oceanography (Biological Sciences 461)****Ornithology (Biological Sciences 475)****Phycology (Biological Sciences 348)****The Vertebrates (Biological Sciences 274)**

Plant Breeding and Biometry

W. D. Pardee, chairman; R. E. Anderson, 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.

Lecs, M W F 9:05; lab, W R or F 1:25; lab section assignments at first lecture. Labs start first week. M. A. Mutschler.

An overview of genetic principles are 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, and genetic aspects of pest resistance. Relationship of genetic concepts and techniques to plant breeding. 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.

603 Methods of Plant Breeding Fall. 4 credits. Primarily for graduate students, but open to qualified seniors who expect to engage in plant breeding. Prerequisites: Biological Sciences 101–102, Biological Sciences 281 or Plant Breeding 225, or equivalent; and field crops, vegetable crops,

floriculture, or pomology. Students must enroll in this course by August 1.

Lecs, T R 8; labs, T R 1:25–4:15 (labs till 5 during first month). 2 S field trips. R. E. Anderson, H. L. Everett.

Breeding systems for producing commercial crop varieties are considered in detail. Laboratories include selection techniques, screening for heritable variation, and controlling pollination. Special emphasis is on selection for disease resistance and improved nutritional quality and on use of exotic germ plasm.

605 Physiological Genetics of Crop Plants Spring. 3 credits. Prerequisites: either genetics, biochemistry, and plant physiology, or permission of instructor.

T R 8–10. D. H. Wallace.
Both genetic and environmental influences on biochemical and molecular control of plant variation in physiological phenomena like photosynthesis, respiration, translocation, self-incompatibility, male sterility, maturity, yield, and heterosis are discussed. Emphasis is on variation that can be exploited in plant breeding, particularly in breeding for higher yield and adaptability.

608 Biochemical Analyses for Plant Breeders Fall. 3 credits. Limited enrollment. Prerequisite: permission of instructor. Students must enroll in this course by Aug. 27.

Lecs, M W 1:25–5 (first 4 weeks); lab, M W 1:25–5 (last 10 weeks). P. Gregory.

Acquaints the student with the specialized biochemical analyses commonly used in plant breeding programs. Nutrients and toxicants of several crops are studied. Importance of developing an ability to critically assess the biochemical analyses is emphasized.

612 Experimental Methods Spring. 2 credits. Prerequisite: Plant Breeding 601 or permission of instructor. Offered alternate years.

M W F 12:20. C. C. Lowe.
The use of statistical methods and the application of experimental designs and plot techniques to problems in plant breeding and related agricultural research.

622 Seminar Fall or spring. 1 credit. S-U grades only.
T 12:20. Staff and graduate students.

629 Special Topics in Plant Science Extension Spring. 2 credits.
F 1:25–4:25. W. D. Pardee.

Designed for graduate students and advanced undergraduates, to provide a broader knowledge of cooperative extension philosophy and methods and to prepare students for careers in extension and research or in related fields in public and commercial organizations. Topics relate to extension in other countries as well as in the United States.

650 Special Problems in Research and Teaching Fall, spring, or summer. 1 or more credits by arrangement with instructor. Undergraduates must attach to their course enrollment material written permission of the staff member who will supervise the work and assign the grade.
Staff.

716 Perspectives in Plant Breeding Strategies Spring. 2 credits. S-U grades optional. Prerequisite: Plant Breeding 603.

R 12:20–2:15. M. E. Sorrells.
Selection techniques and breeding objectives, methods, and strategies for both self- and cross-pollinated crops are reviewed and discussed. Extensive outside reading is required. Emphasis is on discussion and evaluation of selected benchmark papers and current literature.

717 Quantitative Aspects and Related Issues of Plant Breeding Spring. 3 credits. Prerequisites: Plant Breeding 603 and Statistics 601. S-U grades only.

M W F 9:05. R. L. Plaisted, D. R. Viands.
Discussion of random mating populations, inbreeding, components of variance, gene pool development, and other issues pertaining to breeding of cross-pollinated crops.

[718 Genetics and Breeding for Disease and Insect Resistance Fall, first 7 weeks of semester. 1 credit. Prerequisite: Plant Breeding 603. S-U grades only. Not offered 1981–82.
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. F. Mai, acting chairman; J. R. Aist, P. A. Arneson, S. V. Beer, B. B. Brodie, R. S. Dickey, W. E. Fry, M. B. Harrison, R. K. Horst, G. W. Hudler, H. W. Israel, E. D. Jones, R. P. Korf, J. W. Lorbeer, R. Loria, R. L. Millar, W. F. Rochow, W. A. Sinclair, R. W. Smiley, H. D. Thurston, H. D. VanEtten, R. E. Wilkinson, O. C. Yoder, M. Zaitlin, T. A. Zitter

301 Introductory Plant Pathology Fall. 4 credits. Prerequisites: Biological Sciences 101–102 and 103–104 or 105–106. Recommended: Biological Sciences 241 or equivalent.

Lecs, T R 11:15; lab, M T W R or F 2–4:25 plus one period weekly scheduled at the convenience of the student. If afternoon labs become oversubscribed, evening lab sections may be added. W. A. Sinclair.
An introduction to the theory and practice of plant pathology, with emphasis in lectures on principles that govern interactions of plants and pathogens, and in laboratories on diagnostic criteria, life cycles of pathogens, and epidemiological phenomena and control. Specific aspects considered in detail include: fungi, bacteria, nematodes, viruses, and mycoplasmas as plant pathogens; attack and resistance mechanisms; environmental influences; disease forecasting and loss assessment; development of resistant plants; chemical and biological control.

309 Introductory Mycology Fall. 4 credits. Prerequisites: a year of botany or equivalent and permission of instructor.

Lecs, T R 1:25–2:15; labs, T R 2:30–4:25; and additional 2-hour period to be arranged. Required field trips. R. P. Korf.
An introduction to fungi, emphasizing biology and comparative morphology rather than taxonomy.

402 Plant Disease Control Spring. 3 credits. Prerequisite: Plant Pathology 301 or equivalent.
Lecs, T R 11:15; lab and rec, T W or R 1:25–4:25. P. A. Arneson.

This course complements Plant Pathology 301 with an in-depth presentation of the principles and practices of plant disease control, building on the students' knowledge of diseases and their causal agents. General principles and concepts, illustrated by specific examples, are presented. Students write a term paper applying these principles to a specific disease-control problem. The laboratories provide practical experience in diagnosis and disease-control techniques.

443 Pathology and Entomology of Trees and Shrubs (also Entomology 443) Fall. 5 credits. Prerequisites: either Plant Pathology 301 and Entomology 292 or equivalent.

Lecs, M W F 10:10; labs, T R 1:25–4:25 or W F 1:25–4:25. 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 arthropod pests of trees and shrubs. Forest, shade, and ornamental plants are considered.

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.

504 Pest Management for Plant Protection (also Entomology 504) Fall. 4 credits. Limited to seniors and graduate students. Prerequisites: Biological Sciences 360 or equivalent and two of the following: Agronomy 315, Entomology 440, or Plant Pathology 402.

Lecs, M W F 8; lab, M or W 1:25–4:25.
P. A. Arneson.

Intended for practitioners in plant protection. Lectures integrate the principles of pest control, ecology, and economics in the management of pest-crop systems. A term project prepared by a team of four to five students is required and consists of a proposal for an extension pest management program on a specific crop. Laboratories deal with pest monitoring techniques and the application of computer simulation models to management problems.

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. Abarvi

645 Plant Virology

W. F. Rochow, M. Zaitlin.

646 Plant Nematology

M. B. Harrison, W. F. Mai.

647 Bacterial Plant Diseases

R. S. Dickey, S. V. Beer.

648 Pathogen and Disease Physiology

H. D. VanEtten.

649 Mycology Conferences

Fall: Aphyllophorales, jelly fungi; spring: Chytridiomycetes, Oomycetes, (except Peronosporales), Zygomycetes, R. P. Korf.

650 Diseases of Vegetable Crops

Fall.
J. W. Lorbeer, R. E. Wilkinson.

651 Diseases of Fruit Crops

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

653 Dendropathology

G. W. Hudler, W. A. Sinclair.

654 Diseases of Florist Crops

R. K. Horst.

655 Plant Diseases in Tropical Agricultural Development

Spring.
H. D. Thurston.

681 Plant Pathology Seminar

Fall and spring. 1 credit. Required of all plant pathology majors. S-U grades only.
T 4:30–5:30. Staff.

700 The Science of Plant Pathology

Fall. 1 credit.
For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: permission of instructor. S-U grades only.

Lec, R 9:05. R. L. Millar.
For students entering the graduate program. Consideration of plant pathology as a science, with emphasis on concepts, research, and philosophy.

701 Nature of Plant Disease

Spring. 4 credits.
Prerequisites: introductory plant pathology and permission of instructor.

Lecs, M W F 8; lab, W 1:25–4:25. To be announced.
The control of plant disease initiation and development at the molecular, organismal, and population levels of organization. Manipulation of factors important to disease development in populations is considered as the basis for disease management.

705 Plant Virology

Fall (Oct. 6–Nov. 5 only). 1 credit. Primarily for graduate students with a major or minor in plant pathology; others by permission. Prerequisite: permission of instructor.

Lecs, T R 11:15; lab, T or R 1:25–4:25. M. Zaitlin.
Basic information on plant viruses and on the diseases they cause. Emphasis on viral replication mechanisms.

706 Plant Nematology

Spring. 2 credits. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: permission of instructor.

Lec, R 10:10; lab, R 1:25–4:25.
Anatomy, morphology, and taxonomy of plant parasitic forms and nonparasitic soil-inhabiting 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.

707 Bacterial Plant Pathogens

Fall (Nov. 10–Dec. 10 only). 1 credit. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: permission of instructor.

Lec, T R 11:15; lab to be arranged. R. S. Dickey.
Basic information on bacterial plant diseases and phytopathogenic bacteria. The lab includes some of the more important techniques used in the study of bacterial plant pathogens.

[709 Mycology

Spring. 4 credits.
Prerequisites: Plant Pathology 309 or equivalent, a course in genetics, and permission of instructor. Offered alternate years. Not offered 1981–82.

Lec, T 10:10; labs, T R 1:25–4:25; an additional 3-hour period to be arranged. Optional field trips. R. P. Korf.

A detailed study of the biology and taxonomy of the major groups of plant pathogenic fungi (rusts, smuts, Fungi Imperfecti, Peronosporales), with emphasis on mechanisms of variation in fungi.]

711 Diagnosis of Plant Disease

Fall. 1 credit.
Limited to graduate students with a major or minor in plant pathology. Prerequisite: Plant Pathology 701 or equivalent.

Lec, T 9:05 (Sept. 3–Oct. 1 only); lab, T or R 1:25–4:25 (10 labs to be arranged). S. V. Beer and staff.

Provides instruction and practice in the diagnosis of plant diseases. All important classes of plant pathogenic agents (except viruses) are considered. Classical and modern techniques are discussed.

715 Applied Plant Virology

Fall. 1 credit. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: permission of instructor.

Lec, T R 11:15 (Sept. 3–Oct. 1 only); lab to be arranged. T. A. Zitter.

Applied aspects of plant virology including symptomatology, diagnosis, methods of virus transmission, and means of control.

725 Advanced Plant Virology

Spring. 2 credits.
For graduate students with special interest in fundamental aspects of plant virology. Prerequisite: permission of instructor. Offered alternate year.

Hours to be arranged. M. Zaitlin.

726 Advanced Plant Nematology

Fall. 2 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.

728 Molecular Mechanisms of Pathogenesis

Fall. 2 credits. For graduate students with a major in plant pathology or special interest in molecular mechanisms of pathogenesis. Prerequisite: permission of instructor. Offered alternate years.

Hours to be arranged. H. D. VanEtten 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 hypothesis 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.

[729 Taxonomy of Fungi]

Fall. 4 credits.
Prerequisites: Plant Pathology 309 or equivalent, genetics, plant or animal taxonomy, and permission of instructor. Offered alternate years. Not offered 1981–82.

Lec, T R 10:10; labs, T R 1:25–4:25; required field trips. R. P. Korf.

Emphasis is on the principles of taxonomy and nomenclature, 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

W. J. Kender, chairman; G. D. Blanpied, L. L. Creasy, J. N. Cummins, F. W. Liu, G. H. Oberly, R. M. Pool, L. E. Powell, W. C. Stiles, J. P. Tomkins, R. D. Way

100 Introductory Pomology Fall or spring.

3 credits. S-U grades only for graduate students.

Fall: lecs, T R 8; lab, M or W 2-4:25. Spring: lecs, T R 8; lab, T or W 2-4:25. One half-day field trip required. G. H. Oberly, J. P. Tomkins.

A study of the general principles and practices of fruit culture and their relation to the underlying sciences. Included are tree fruits, grapes, small fruits, and nuts. Topics covered include propagation, varieties, crop management, and growth and fruiting habits. Practical work is presented in grafting, pruning, site and soil selection, and planting.

208 Economic Fruits of the World Spring.

3 credits. Prerequisite: introductory biology, or permission of instructor. Offered alternate years.

Lecs, M W 10:10; lab, F 2-4:25. F. W. Liu.
The more important subtropical and tropical fruits such as citrus, banana, pineapple, mango, coffee, and cacao are considered. Morphology, physiology, and adaptation to climate are stressed rather than details of culture. A broad view of world pomology is given.

302 Fruit Tree Nursery Operation Spring, first 4½ weeks. 1 credit. Prerequisite: Pomology 100 or permission of instructor. S-U grades optional. Offered alternate years.

Lecs, M W 9:05; lab, M 2-4:25. J. N. Cummins.
This course is intended to familiarize the fruit producer with the operations and problems of the fruit tree nursery operator. Topics include production objectives, management decisions, and cultural aspects of nursery operation. Techniques of grafting, budding, pest identification, inspection, and grading of fruit tree planting stocks are included.

304 Orchard Management I Spring. 3 credits. Prerequisite: Pomology 100.

Lecs, M W 8; lab, R 1:25-4:25. L. E. Powell, W. C. Stiles.
A treatment of problems of concern to fruit growers such as site selection, planting and pruning systems, water relations, cold hardiness, dormancy, flowering, and fruiting. Physiological and practical aspects are emphasized.

305 Orchard Management II Fall. 3 credits. Prerequisite: Pomology 100. Recommended: Pomology 304.

Lecs, M W 8; lab, R 1:25-4:25. G. H. Oberly, L. L. Creasy.
A continuation of the principles of pomology presented in Pomology 304. Subjects include the later stages of fruit maturation, quality, harvesting, aspects of tree nutrition, protection from pests, and regulatory policies affecting fruit production and sale.

306 Small Fruits Spring, last 9 weeks. 2 credits. Prerequisite: Pomology 100 or permission of instructor. Offered alternate years.

Lecs, M W 9:05; lab, M 2-4:25. J. P. Tomkins.
A study of the general principles and practices in the commercial culture of strawberries, brambles, blueberries, currants, gooseberries, elderberries, and cranberries.

307 Viticulture Fall. 3 credits. Prerequisite: Pomology 100 or permission of instructor. Offered alternate years.

Lecs, T R 9:05; lab, T 2-4:25. R. M. Pool.
Viticulture, with emphasis on the viticulture of the Great Lakes region, as a series of interrelated decisions on varieties, sites, vine management, and vine protection, is presented. Those decisions are based on ampelography, meteorology, soils, vine and grape anatomy and physiology, as well as protection of the vine and grapes from injuries, primarily diseases and insects.

310 Postharvest Physiology and Storage of Fruits and Vegetables Fall. 3 credits. Prerequisite: a course in pomology or vegetable crops, or permission of instructor.

Lecs, M W 9:05; lab, F 2-4:25. One field trip is required. F. W. Liu.

The chemistry and physiology of fruits and vegetables as they affect quality and marketability are studied. Maturity indices, handling methods, and storage practices are considered. Practical work includes observations of the effect of handling and storage methods on quality and condition of fruits and vegetables.

311 Fruit Crop Systematics Fall, first 4½ weeks. 1 credit. Prerequisite: Pomology 100 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1981-82.

Lecs, T R 9:05; lab, T 2-4:25. G. H. Oberly.
The classification of fruit species is considered from a botanical and production viewpoint. The course deals with the identification and naming of fruit species and varieties and their botanical classification.]

313 Utilization of Fruit Crops Fall, middle 4½ weeks. 1 credit. Prerequisite: Pomology 100 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1981-82.

Lecs, T R 9:05; lab, T 1:25-4:25. F. W. Liu.
A consideration of the fate after processing of fruits produced for consumption. The coverage of fruit products is generally limited to those commercially grown and processed in New York State. Although the discussion includes methods of canning, freezing, dehydration, and other types of processing, emphasis is on the quality requirement and proper handling of raw materials and how they affect the quality of end products.]

315 Fruit Variety Improvement Fall, last 4½ weeks. 1 credit. Prerequisite: Pomology 100 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1981-82.

Lecs, T R 9:05; lab, T 2-4:25. R. D. Way.
The techniques and limitations of producing new varieties of perennial fruit crops are considered.]

400 Undergraduate Seminar Spring. 1 credit (may be taken twice for credit). Prerequisite: a course in pomology. S-U grades only.

Hours to be arranged. Staff.
Seminar topics and speakers selected and arranged by the students on subject areas related to pomology.

402 Special Topics in Experimental Pomology Spring. 3 credits. Open to undergraduates by permission. Offered alternate years. Not offered 1981-82.

Hours to be arranged. Staff.
Selected topics are considered with respect to the current literature or experimental techniques. Topics reflect the research interests of the professors who participate]

604 Growth and Development of Woody Plants Spring. 2 credits. Prerequisite: introductory plant physiology. Offered alternate years.

T R 9:05. L. E. Powell.
An advanced course dealing with physiological, morphological, and biochemical changes during development, beginning with the seed and advancing through the mature reproductive plant. Hormonal control mechanisms emphasized.

610 Research Fall or spring. 2 or more credits. Prerequisite: a course in advanced pomology. S-U grades optional. Undergraduates must attach to their course enrollment material written permission from the staff member who will supervise the work and assign the grade.

Staff.

700 Graduate Seminar Fall. 1 credit. S-U grades only.

Hours to be arranged. Staff.
Reports by students on current research or literature in experimental pomology or related areas.

710 Teaching Experience Fall or spring. 1 credit. S-U grades only. Prerequisite: permission of instructor.

Hours to be arranged. Staff.
Designed to acquaint pomology graduate students with the methods and materials involved in teaching. The student participates in the design, delivery and evaluation of segments of a departmental course.

Related Course in Another Department**General Horticulture (Vegetable Crops 103)****Rural Sociology**

E. C. Erickson, chairman; M. L. Barnett, F. H. Buttel, H. R. Capener, E. W. Coward, Jr., G. J. Cummings, P. R. Eberts, E. C. Erickson, J. D. Francis, P. Garrett, C. C. Geisler, J. C. Preston, B. M. Scott, F. W. Young

100 Introduction to Sociology Fall. 3 credits.

Lecs, T R 10:10; disc, M or F 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. C. C. Geisler and staff.
An examination of the theories, concepts, and methods of sociology as they apply to sociology in general. Major topics include the origins of the discipline, its major theoretical and methodological currents, and its application to contemporary questions of power and bureaucracy, social and cultural change, materialism and sociobiology, social class and community institutions. 100 is formally equivalent to 101 (offered in the spring), though less emphasis is placed on rural society and its problems.

101 Introduction to Rural Sociology Spring. 3 credits.

Lecs, T R 10:10; disc, M or F 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. G. Rolleston.
An examination of the theories, concepts, and methods of sociology as they apply to rural society, particularly in relation to major issues concerning the United States agricultural and food systems. Major topics include change in the structure of agriculture and in rural communities, inequality in rural America, the structure and functioning of agribusiness organizations, agricultural policy, energy and environmental problems, and alternative futures for rural development in the United States 101, though placing greater emphasis on rural society, is equivalent to 100 (offered in the fall).

104 Proseminar: Issues and Problems in Rural Society Fall. 1 credit. S-U grades only.

R 12:20-1:25. Staff.
Introduces the student to subject matter of concern to both applied and academic rural sociologists. Focuses on such subjects as migrant workers, agribusiness, rural poverty, rural to urban migration rural development, agricultural research and people, community development, small farmers in the less developed nations. These topics are explored through the use of films and group discussion.

105 Rural Sociology and World Development Problems Spring. 3 credits.

M W F 10:10. E. W. Coward, Jr.
An introduction to the analysis of some pressing social problems of contemporary Third World countries. Lectures and reading materials will present different approaches, analyses, and recommendations which follow from competing theories, in order that the student may determine which approach best explains the situation in Third World countries. Topics to be considered include: visions of "development"; the social organization of peasant communities and large-scale agricultural enterprises; problems of land tenure and agrarian reform; the relationships among population growth, hunger, and employment; multinational corporations; social movements and social control.

213 Social Indicators and Data Management

Spring. 3 credits.

M W F 11:15. F. W. Young.

Introductory sociological research methods, from the perspective of social indicators, their construction, sources of data, and their policy relevance. The course also surveys currently reported social indicators for the United States. Students work through computer exercises illustrating basic data management using SPSS programs on the 370 and other programs on microcomputers.

240 Social History of American Agriculture

Spring. 3 credits. No prerequisites.

T R 8:00–9:55. E. C. Erickson and staff.

A social and technical history of the changes in agriculture and the agricultural systems in the United States from about 1800 to the present day. Includes documentation of the technologies associated with agriculture as well as the rural social organization that supported the agricultural system (such as farm organizations, marketing systems, export patterns, transportation systems). Emphasizes the energy systems that included animal and human power in the eighteenth and nineteenth century, horsepower in the latter nineteenth century, steam and mechanical power from the early twentieth century onwards, and the managerial emphasis of the recent years.

324 Social Organization and the Environment

Spring. 3 credits.

M W F 9:05. G. Rolleston.

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

(also Anthropology 314) Fall. 3 credits.

Lecs. T R 10:10, Disc. T or R 11:15. M. L. Barnett.

An analysis of planned social change programs in predominantly agricultural societies. Focusing on problems of administration, socioeconomic development, and the introduction of new practices.

356 Rural Society in America Fall. 3 credits. S-U grades optional.

M W F 9:05. G. Rolleston.

The focus is on gaining a greater understanding of and appreciation for the rural sector of American society. From sociological and historical perspectives, the nature of changes in rural society are examined, including the impact of technology on agriculture, other extractive industries, natural resources, the environment, regional variation, the rural-urban dominance theme, comparative life styles, cultural orientations, value patterns, and a look to the future.

357 Subsistence Agriculture in Transition

Spring. 3 credits.

Lecs. T R 10:10, Disc. T or R 11:15. M. L. Barnett.

An analysis of selected types of peasant communities, drawn from differing ecological conditions. Social structure, systems of farming and land tenure arrangements, and motivational characteristics of subsistence farmers in the context of socioeconomic change. Theoretical and policy aspects of modernization and traditional agriculture and programming for agricultural development.

380 Independent Honors Research in Social Science

1–6 credits. Limited to students who have met the requirements for the honors program. A maximum of 6 credits may be earned in the honors program.

Staff.

Students must submit written proposals, by the third week of the semester of their senior year, to P. Garrett, departmental honors committee representative.

404 Intermediate Sociological Theory (also Sociology 404)

Fall. 4 credits. S-U grades optional.

T 2:30–5:00. J. Kahl.

An advanced undergraduate seminar for senior majors in rural sociology and sociology. The course focuses on: (1) the central concepts of the sociological tradition; (2) major classical theorists (Marx, Weber, Durkheim, Tocqueville) and contemporary counterparts; (3) application of the classical ideas in contemporary research.

410 Leadership and Authority in Group Relations

Fall and spring. 2 credits. Limited to upperclass and graduate students. Prerequisite: written permission of instructor. Prior experience with groups is preferred.

T R 2:30–4:25. H. Kramer.

Examination of group relations, leadership, and exercise of authority. Study of what happens in and among groups as it occurs. Special attention is paid to covert processes that influence groups. Students apply their learning to future professional interactions with client, community-development task, or other work groups.

[424 Technology and Social Change

Fall. 3 credits. Not offered 1981–82.

T R 12:20–1:35. S. Del Sesto.

The effect of technology in the process of social change is examined. Different theories of social change are applied to specific issues in technology such as new energy systems, environmental pollution, the management of natural resources, genetic engineering and behavior control, and the relations between science and technology and alienation. The objective is to explain the movement of current events and to predict changes and outcomes in these issue areas.]

432 Community Development

Fall. 3 credits.

T R 8–9:55. 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 Seminar

Spring. 2 or 3 credits.

Prerequisite: Rural Sociology 100, 101, or 105.

T 2:30–4:25. G. J. Cummings.

A review of selected approaches to understanding patterns of change in small population settlements. The concept of self-help along with other options for development are examined in terms of their potential contributions for enhancing the quality of community life.

[443 Politics and Development

Fall. 3 credits.

Limited to upperclass and graduate students.

Prerequisite: Rural Sociology 100 or equivalent. S-U grades optional. Not offered 1981–82.

M W F 1:25. P. R. Eberts.

Comparative analyses of politics as a significant process affecting development in both advanced and developing societies. Politics and policies are analyzed as results of pluralism and inequalities among various socioeconomic classes, different-sized firms and communities, and mutually interdependent institutions. They also are seen as major means of social control and resource redistribution in production, allocation, and service-staffing processes.]

445 Rural Social Stratification

Fall. 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 non-market,

agricultural and nonagricultural activities; theories of change in stratification. Appropriate for majors in development sociology and international agriculture.

462 Changing Health Perspectives Spring. 3 credits.

M W F 2:30. G. J. Cummings.

Major determinants of health status and their interrelationships are studied as a basis for evaluating various models that are proposed for improving the organization of health services for underserved populations. Readings are mainly drawn from the United States and Canadian experiences. Other cases can be considered according to student interests.

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, and symbolic structural theory are compared.

[618 Research Design I

Fall. 4 credits. Prerequisite: one course in statistics. Not offered in 1981–82.

M W F 10:10; lab to be arranged. J. D. Francis.

First of a two-semester sequence (may be taken individually) in graduate methods. This course discusses problems of measurement, the design of measuring instruments, and problems of reliability and validity. Some common forms of measuring instruments are discussed, including multidimensional techniques. Students are expected to use actual data for labs.]

[619 Research Design II

Spring. 4 credits. Prerequisite: an introductory methods course or a statistics course. Not offered 1981–82.

M W F 10:10; lab to be arranged. J. D. Francis.

The second part of the sequence in graduate methods deals with sampling frames, some pragmatic sampling techniques, and some discussion of statistical analysis procedures appropriate under each. An intermediate-level treatment of the following topics: nonexperimental designs, regression analysis, analysis of variance, analysis of covariance, and causal models. A classic piece of sociological research is one source of illustration and a component of the lab exercises. Students are expected to use actual data to familiarize themselves with data handling and processing.]

621 Environmental Sociology Spring. 3 credits.

W 1:25–4:25. F. H. Buttel.

An exploration of various sociological approaches to the study of society and its physical environment and an analysis of major issues relating to the survival base of human societies—particularly overpopulation, the energy and food crises, the limits-to-growth debate, and the conduct of political struggles over energy and environmental policy.

[641 Political Economy of Rural and Regional Development

Spring. 3 credits. Limited to upperclass or graduate students. S-U grades optional. Not offered 1981–82.

T R 10:10–11:25. P. R. Eberts.

A survey of social, political, and economic factors in regional development. Theories and case studies

from demography, human ecology, social organization, and planning are used to examine the emergence or retardation of regions, and their implications for contemporary developing, and developed societies.]

[642 Regional Systems and Policy Analysis]

Spring. 3 credits. Prerequisites: a social or economic theory course and statistics, or permission of the instructor. S-U grades optional. Not offered 1981-82. Lec, F 2:20-4:30; disc to be arranged. P. R. Eberts. A systems analysis of theoretical and research problems arising from localities' changing social organization. Major theories are examined with attention to their compatibility with modern policy analytic techniques. Topics covered center on the interplay of economic, social class, and political activities in localities.]

650 Social Organization of Agriculture Fall. 3 credits.

R 1:25-4:25. E. C. Erickson. Concentrates on a small number of significant commercial crops, examining the institutions and relationships involved in the production process: research, credit, distribution of inputs, the farm operation, processing, transportation, and marketing. Patterns at the farm and community level, including topics such as settlement, land tenure, ethnic groups, class structures, methods of cooperation, small farmers, labor problems, and information networks. Ecological and physical constraints on production. Emphasis on the influence of national and international structures—political, social, and economic—on the production process, including the role of government and quasi-government units. Examines the historical circumstances giving rise to the present crop systems. Consideration of what rearrangements of the political, social, and economic structures, both domestic and international, are required for change in crop systems, improvement in production, and increased social welfare.

[651 Structural Change in United States Agriculture] Fall. 3 credits. Not offered 1981-82. 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. 3 credits. Not offered 1981-82.

Hours to be arranged. F. H. Buttel, C. C. Geisler, and P. Garrett.

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 Theoretical Issues and Methodological Alternatives in Field Research Spring. 3 credits. Letter grade only.

R 1:25-4:25. P. Garrett. A graduate seminar dealing with the design of field research, specifically the articulation of theory and methods. Readings illustrate different theoretical orientations and methodological techniques. Substantive problem areas considered include: technological change, social stratification, dependency, and modes of production. Students explore theoretical issues and methodological alternatives applicable to their own research.

712 Factor Analysis and Multidimensional Scaling Fall. 4 credits. Prerequisite: previous course work in scaling and statistics.

M W F 10:10; lab to be arranged. J. D. Francis. An advanced course in measurement and scaling, building from work by Thurstone and Coombs, to multidimensional measurements. Topics include philosophy of factor analysis, factor analysis models, factoring design, factoring techniques, and comparison with factor analysis models. Multidimensional scaling and discriminant analyses are also discussed. As matrix algebra is an integral part of these procedures, class time is devoted to this topic.

[715 Macrosocial Accounting and Evaluation] Spring. 3 credits. Not offered 1981-82.

R 1:25-4. F. W. Young. A new methodology for monitoring and evaluating rural development projects based on data from informants, field analysis with a microcomputer system, and a generalized evaluation design. The relationship of this method to conventional evaluation as well as to comparative subnational analysis of whole countries is reviewed.]

717 Regression and Path Analysis Spring. 4 credits. Prerequisite: two courses in statistics and one in methods.

M W F 10:10; lab to be arranged. J. D. Francis. The first part of the course reviews multiple and nonlinear regression. Two-stage least squares models are discussed for sociological data along with a discussion of nonmetric regression. The latter half of the course deals with recursive and nonrecursive path models.

[723 Social Movements in Agrarian Society] Spring. 3 credits. Not offered 1981-82.

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.]

741 Community Development and Local Control Spring. 3 credits.

Hours to be arranged. 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 1981-82.

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 Spring. 3 credits.

Hours to be arranged. M. L. Barnett, E. W. Coward, Jr., and 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, 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. W. T. Federer.

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.

M W F 10:10; disc, M 3:35. Prelims, 6:30 p.m. Oct. 13 and Nov. 17. S. J. Schwager.

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.

M W F 10:10; disc, M 3:35. Prelims, 6:30 p.m. Mar. 11 and Apr. 22. S. J. Schwager.

The concepts developed in Statistics 408 are applied to provide an introduction to the classical theory of parametric statistical inference. Topics include data reduction and the concept of sufficiency, parameter estimation, hypothesis testing, and linear regression. Students seeking training in statistical methodology should consider Statistics 601-607.

416 Matrix Algebra Fall. 2 credits. Prerequisite: precalculus mathematics.

Lecs, M W F 8; disc, M 1:25-2:15 (first 7 weeks). S. R. Searle.

Definitions, basic operations and arithmetic, determinants, and the inverse matrix. Emphasis is on understanding basic ideas.

417 Matrix Algebra II Fall. 2 credits. Prerequisite: Statistics 416 or permission of the instructor. No auditors.

Lecs, M W F 8; disc, M 1:25–2:15 (second 7 weeks). S. R. Searle.

Rank, linear dependence, canonical forms, linear equations, generalized inverses, characteristic roots and vectors. Emphasis is on developing skills for applying matrix algebra.

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. Lec, M W F 9:05 or 11:15; lab, M 12:20–1:50 (two sections), 2:30–4 (two sections), 7:30–9 or T 12:20–1:50 or 2:30–4 (two sections). When two sections meet simultaneously, one may be more mathematical than the other, depending on the availability and interest of students with a knowledge of calculus. Prelims, 7 p.m. Oct. 15 and Nov. 19.

Statistical methods, both parametric and nonparametric, are developed and used to analyze data arising from a wide variety of applications. Topics include 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. 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. 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. Selected topics from pairwise comparisons among means, transformations of data, response surface methodology, treatment design, weighted regression, split plot experiments, combining experiments, analysis of categorical data, and multivariate analysis. The SAS statistical computing package is used.

[605 Applied Regression Analysis] Fall. 1 credit.

Prerequisite: Statistics 602. Not offered 1981–82.

A continuation of Statistics 602, with emphasis on data analysis using a regression or linear model approach. Comparison of variable selection procedures. Biased estimation. Variable selection for

prediction. Regression approach to nonorthogonal analysis of variance situations. Case study for complex data set.]

[606 Sampling Biological Populations] Fall.

1 credit. Prerequisite: Statistics 601 or equivalent. Offered alternate years. Not offered 1981–82.

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. Nonparametric and distribution-free alternatives to normal-theory testing procedures are presented: randomization tests; location and scale tests for two populations; analyses for completely randomized, randomized blocks, and balanced incomplete blocks designs; comparisons among several means; correlation and regression; goodness-of-fit.

[662 Mathematical Ecology (also Biological

Sciences 662)] Spring. 3 credits. Prerequisites: a

year of calculus, a course in statistics. Offered alternate years. Not offered 1981–82. Mathematical and statistical analysis of populations and communities: theory and methods. Spatial and temporal pattern analysis, deterministic and stochastic models of population dynamics. Model formulation, parameter estimation, simulation and analytical techniques.]

699 Special Problems in Statistics and Biometry

Fall, spring, or summer. 1 credit or more by arrangement with instructor.

Staff.

701 Advanced Biometry Spring. 3 credits.

Prerequisites: Statistics 409 and 602.

T R 1:30–2:45. D. S. Robson.

Bioassay methods including parametric and nonparametric statistical analyses of quantal and graded response to controlled levels of single and multifactor stimuli; directional statistics as applied to animal orientation experiments; compartment models and analyses; enzyme kinetics and pharmacokinetic analysis; bioavailability.

713 Experimental Design Fall. 4 credits.

Prerequisites: Either Statistics 416 and 602 or equivalent. Offered alternate years.

T R 8–9:50; disc to be arranged. W. T. Federer.

Principles and techniques of experimentation, theoretical concepts, extensions and variations of the completely randomized, generalized blocked, and generalized row by column experiment designs, repeated measures designs, interval estimation for ranked means, transformations, unequal variances, additivity, residual analyses, sample size, variance component analyses, unequal number analyses, the place of orthogonality, balance and confounding in design, model selection, and advanced statistical methodology.

[714 Treatment Design and Related Experiment

Designs.] Fall. 4 credits. Prerequisites: Statistics

416–417 and 602. Offered alternate years. Not offered 1981–82.

Treatment design, the selection of treatments for an experiment, is divided into factorial, response surfaces, mixtures, and combinations of these. Single degree of freedom contrast matrices, factorial design theory for prime powers and nonprime powers, confounding, split plot, split block, complex confounded designs, lattice designs derivable from pseudofactorial theory, fractional replication, response surface designs, and designs and analyses for mixtures, including diallel crossing designs, are covered. Statistical analyses involving residual

analyses and real data are included. Emphasis is on concepts and applications rather than mathematical manipulations.]

[717 Linear Models] Spring. 3 credits.

Prerequisites: Statistics 409, 417, and 602 or Mathematics 472. S-U grades only. Offered alternate years. Not offered 1981–82.

Introduction to multinomial 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.]

[720 Statistical Design Theory] Fall. 3 credits.

Prerequisites: Mathematics 431–432 and a course in design theory. S-U grades only. Not offered 1981–82.

Primarily for those doing research on statistical design topics. Areas discussed are generalizations of balanced and partially balanced block design theory, F-square and latin square geometries, variance and other optimality criteria, fractional replication, and other topics of interest to participants. Many unsolved statistical design problems are posed.]

799 Statistical Consulting Fall and spring.

2 credits. Limited to graduate students.

Consulting, 1 hour a week; disc, 1 hour a week; hours to be arranged. Staff.

Participation in the Biometrics Unit consulting service: faculty-supervised statistical consulting with researchers from other disciplines. Discussion sessions for joint consideration of selected consultations encountered by the service during previous weeks.

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

R. D. Sweet, chairman; L. Ellerbrock, E. E. Ewing, J. R. Hicks, W. C. Kelly, D. Lisk, P. M. Ludford, P. L. Minotti, H. M. Munger, M. A. Mutschler, R. F. Sandsted, L. D. Topoleski, D. H. Wallace, H. C. Wien

103 General Horticulture Spring. 4 credits. Each lab limited to 25 students.

Lecs, M W F 8; lab, M T W R 2–4:25.

L. D. Topoleski.

Acquaints the student with applied and basic horticulture. Primarily for students who want a general knowledge of the subject or who want to specialize in horticulture but have a limited background in practical experience or training in plant science. Includes flower, fruit, and vegetable growing and gardening techniques.

123 Organic Gardening Spring. 2 credits. Each section limited to 20 students. Primarily for students not enrolled in the College of Agriculture and Life Sciences. Prerequisite: permission of instructor.

M T W or R 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. Limited to 50 students. Prerequisites: Vegetable Crops 103 and Agronomy 200.

Lecs, M W F 11:15; lab, W or F 2-4:25; field trips (Sept.), W 11:15-6. E. E. Ewing.

Intended for those interested in the commercial vegetable industry from the viewpoint of production, processing, marketing, or the related service industries. Topics included are techniques, problems and trends in the culture, harvesting, and storage of the major vegetable crops, including potatoes.

312 Postharvest Handling and Marketing of Vegetables Fall. 3 credits.

Lecs, T R 9:05; lab, R 2-4:25; field trips in early fall. J. R. Hicks.

Procedures used in marketing and shipping vegetables, including grade standards, methods of grading, packaging, harvesting methods, cooling principles, storage techniques, and market preparation.

401 Vegetable Crop Physiology Fall. 5 credits. Prerequisites: Vegetable Crops 211 and Biological Sciences 242 or equivalents.

Lecs, M W F 11:15; lab, M 2-4:25; disc, R or F 1, 2, or 3. W. C. Kelly.

Subjects include mineral nutrition as influenced by fertilization programs and crop sequence; nutrient interactions and induced deficiencies; growth and development; flowering; fruit setting; growth correlation; senescence; sex expression; photoperiodism; vernalization; and environmental factors affecting growth.

[413 Kinds and Varieties of Vegetables] Fall. 3 credits. Prerequisite: Vegetable Crops 211 or permission of instructor. Offered alternate years. Not offered 1981-82.

Lab, W F 2-4:25. H. C. Wien.
Designed to help students achieve proficiency in the evaluation of vegetable varieties through study of their origins, characteristics, adaptation, and usage. An important part of the course is the study of crops in the field. The vegetable seed industry is also discussed.]

421 Plant-Plant Interactions Spring. 3 credits. Prerequisites: Any crop production course or permission of instructor.

Lecs, M W 8; disc, F 8. P. L. Minotti.
The manner in which plants affect the growth of other plants is examined with emphasis on crop situations rather than natural plant communities. Interactions in monoculture are considered as well as crop-associate crop interactions and weed-crop interactions. Fridays are devoted to a discussion of weed control methods widely used in the production of vegetable crops.

499 Undergraduate Research Fall or spring. 1 or more credits, by arrangement. Written permission from staff member directing the work must be obtained before course enrollment.
Hours to be arranged. Staff.
Special problems may be elected in any line of vegetable work.

601 Seminar Fall or spring. 1 credit. Required of graduate students majoring or minoring in vegetable crops. Limited to graduate students. S-U grades only. R 4:30. Staff.

610 Special Topics in Vegetable Crops Fall or spring. 1 or more credits.
Hours to be arranged. Staff.

612 Postharvest Physiology of Horticultural Crops Spring. 2 credits. Prerequisite: permission of instructor. Offered alternate years.

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 1981-82.

T R 9:05-11. W. C. Kelly.
The planning of applied research programs. The advantages and limitations of conventional experimental designs as they apply to specific research problems. Discussions include a critical interpretation of experimental results from the literature.]

801 Master's Thesis Research Fall or spring. Credit to be arranged. S-U grades only.
Hours to be arranged. Staff.

901 Doctoral Thesis Research Fall or spring. Credit to be arranged. S-U grades only.
Hours to be arranged. Staff.

Related Course in Another Department

Special Topics in Plant Science Extension (Plant Breeding 629)

Faculty Roster

Abawi, George S., Ph.D., Cornell U. Assoc. Prof., Plant Pathology (Geneva)
Acree, Terry E., Ph.D., Cornell U. Assoc. Prof., Food Science and Technology (Geneva)
Adleman, Marvin I., M.L.A., Harvard U. Prof., Floriculture and Ornamental Horticulture
Ainslie, Harry R., Ph.D., Kansas State U. Prof., Animal Science
Aist, James R., Ph.D., U. of Wisconsin. Assoc. Prof., Plant Pathology
Albright, Louis D., Ph.D., Cornell U. Assoc. Prof., Agricultural Engineering
Alconero, R., Ph.D., U. of Wisconsin. Assoc. Prof., Seed and Vegetable Sciences (Geneva)
Aldwinckle, Herbert S., Ph.D., U. of London. Assoc. Prof., Plant Pathology (Geneva)
Alexander, Martin, Ph.D., U. of Wisconsin. Liberty Hyde Bailey Professor of Soil Science, Agronomy
Allee, David J., Ph.D., Cornell U. Prof., Agricultural Economics
Anderson, Bruce L., Ph.D., U. of California at Berkeley. Asst. Prof., Agricultural Economics
Anderson, Ronald E., Ph.D., U. of Wisconsin. Assoc. Prof., Plant Breeding and Biometry
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. Assoc. Prof., Natural Resources
Bail, Joe P., Ph.D., Michigan State U. Prof., Education
Baker, Robert C., Ph.D., Purdue U. Prof., Poultry and Avian Sciences
Bandler, David K., M.P.S., Cornell U. Assoc. Prof., Food Science
Barbano, David M., Ph.D., Cornell U. Asst. Prof., Food Science
Barker, Randolph, Ph.D., Iowa State U. Prof., Agricultural Economics

Barnett, Milton L., Ph.D., Cornell U. Prof., Rural Sociology
Barton, Donald W., Ph.D., U. of California at Berkeley. Prof., Seed and Vegetable Sciences (Geneva)
Bartsch, James A., Ph.D., Purdue U. Asst. Prof., Agricultural Engineering
Bassuk, Nina L., Ph.D., U. of London. Asst. Prof., Floriculture and Ornamental Horticulture
Bauman, Dale E., Ph.D., U. of Illinois. Assoc. Prof., Animal Science
Bayer, George H., Ph.D., Cornell U. Prof., Vegetable Crops
Beer, Steven V., Ph.D., U. of California at Davis. Assoc. Prof., Plant Pathology
Beermann, Donald H., Ph.D., U. of Wisconsin. Asst. Prof., Animal Science
Berkey, Arthur L., Ph.D., Michigan State U. Prof., Education
Bills, Nelson L., Ph.D., Washington State U. Assoc. Prof., Agricultural Economics
Bing, Arthur, Ph.D., Cornell U. Prof., Floriculture and Ornamental Horticulture
Black, Richard D., Ph.D., U. of Illinois. Assoc. Prof., Agricultural Engineering
Blandford, David, Ph.D., Manchester U. Assoc. Prof., Agricultural Economics
Blampied, George D., Ph.D., Michigan State U. Prof., Pomology
Bloom, Stephen E., Ph.D., Penn State U. Assoc. Prof., Poultry and Avian Sciences
Boisvert, Richard N., Ph.D., U. of Minnesota. Assoc. Prof., Agricultural Economics
Boodley, James W., Ph.D., Penn State U. Prof., Floriculture and Ornamental Horticulture
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
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
Brunk, Max E., Ph.D., Cornell U. Prof., Agricultural Economics
Bugliari, Joseph B., L.L.B., Cornell U. Prof., Agricultural Economics
Burr, Thomas J., Ph.D., U. of California at Berkeley. Asst. Prof., Plant Pathology (Geneva)
Butler, Walter R., Ph.D., Purdue U. Assoc. Prof., Animal Science
Buttel, Frederick H., Ph.D., U. of Wisconsin. Assoc. Prof., Rural Sociology
Call, David L., Ph.D., Cornell U. Prof., Agricultural Economics
Campbell, Joseph K., M.S., Cornell U. Assoc. Prof., Agricultural Engineering
Capener, Harold R., Ph.D., Cornell U. Prof., Rural Sociology
Carruthers, Raymond I., Ph.D., Michigan State U. Asst. Prof., Entomology
Casella, George, Ph.D., Purdue U. Asst. Prof., Plant Breeding and Biometry
Casler, George L., Ph.D., Purdue U. Prof., Agricultural Economics
Chapman, Lewis D., Ph.D., U. of California at Berkeley. Assoc. 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
- Conklin, Howard E., Ph.D., Cornell U. Prof., Agricultural Economics
- Conneman, George J., Ph.D., Penn State U. Prof., Agricultural Economics
- Conrad, Jon M., Ph.D., U. of Wisconsin. Asst. Prof., Agricultural Economics
- Cooke, J. Robert, Ph.D., North Carolina State U. Prof., Agricultural Engineering
- Coward, E. Walter, Ph.D., Iowa State U. Assoc. Prof., Rural Sociology
- Crawford, Robert H., Ph.D., Syracuse U. Assoc. Prof., Communication Arts
- Creasy, Leroy L., Ph.D., U. of California at Davis. Prof., Pomology
- Cummings, Gordon J., Ph.D., Cornell U. Prof., Rural Sociology
- Cummins, James N., Ph.D., Southern Illinois U. Assoc. Prof., Pomology and Viticulture (Geneva)
- Cunningham, Danis L., Ph.D., Virginia Polytechnic Inst. Asst. Prof., Poultry and Avian Sciences
- Cupp, Eddie W., Ph.D., U. of Illinois. Assoc. Prof., Entomology
- Currie, W. Bruce, Ph.D., Macquarie U. Assoc. Prof., Animal Science
- Cushman, Harold R., Ph.D., Cornell U. Prof., Education
- Davis, Alexander C., Ph.D., Cornell U. Prof., Entomology (Geneva)
- Day, Lee M., Ph.D., U. of Minnesota. Prof., Agricultural Economics
- Delwiche, Eugene A., Ph.D., Cornell U. Prof., Microbiology
- Dethier, Bernard E., Ph.D., Johns Hopkins U. Prof., Agronomy
- Dewey, James E., Ph.D., Cornell U. Prof., Entomology
- Dickey, Robert S., Ph.D., U. of California at Berkeley. Prof., Plant Pathology
- Dickson, Michael H., Ph.D., Michigan State U. Prof., Seed and Vegetable Sciences (Geneva)
- Dietert, Rodney R., Ph.D., U. of Texas at Austin. Asst. Prof., Poultry and Avian Sciences
- Docherty, Terence R., Ph.D., Ohio State U. Asst. Prof., Animal Science
- Dolan, Desmond D., Ph.D., Cornell U. Assoc. Prof., Seed and Vegetable Sciences (Geneva)
- Dondero, Norman C., Ph.D., Cornell U. Prof., Microbiology
- Downing, Donald L., Ph.D., U. of Georgia. Prof., Food Science and Technology (Geneva)
- Drake, William E., Ph.D., Michigan State U. Prof., Education
- Duke, William B., Ph.D., U. of Illinois. Assoc. Prof., Agronomy
- Dunn, James A., Ph.D., U. of Michigan. Prof., Education
- 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. Assoc. 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, Herbert L., Ph.D., Yale U. Prof., Plant Breeding and Biometry
- Everett, Robert W., Ph.D., Michigan State U. Assoc. Prof., Animal Science
- Everhart, W. Harry, Ph.D., Cornell U. Prof., Natural Resources
- Ewing, Elmer E., Ph.D., Cornell U. Prof., Vegetable Crops
- 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
- Fitzgerald, James A., Ph.D., Cornell U. Asst. Prof., Animal Science
- 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. Assoc. 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
- 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. Asst. Prof., Microbiology
- Gilpatrick, John D., Ph.D., U. of California at Berkeley. Assoc. Prof., Plant Pathology (Geneva)
- Glass, Edward H., Ph.D., Ohio State U. Prof., Entomology (Geneva)
- Glock, Marvin D., Ph.D., Iowa State U. Prof., Education
- 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, Goerge 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. Asst. Prof., Food Science
- Greenberg, E. Peter, Ph.D., U. of Massachusetts. Asst. Prof., Microbiology
- Gregory, Peter, Ph.D., Kings Coll. Asst. 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. Assoc. 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. Assoc. Prof., Agricultural Engineering
- Hall, Lana L., Ph.D., U. of California at Berkeley. Asst. Prof., Agricultural Economics
- Haller, Emil J., Ph.D., U. of Chicago. Prof., Education
- Hang, Yong D., Ph.D., McGill U. Asst. Prof., Food Science and Technology (Geneva)
- Harman, Gary E., Ph.D., Oregon State U. Assoc. Prof., Seed and Vegetable 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. Asst. 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. Prof., Food Science and Technology (Geneva)
- Hudler, George W., Ph.D., Colorado State U. Asst. Prof., Plant Pathology
- Hunter, James E., Ph.D., U. of New Hampshire. Assoc. Prof., Plant Pathology (Geneva)
- Irish, Wilnot W., M.S., U. of Illinois. Assoc. 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, 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
- Kelly, William C., Ph.D., Cornell U. Prof., Vegetable Crops
- Kender, Walter J., Ph.D., Rutgers U. Prof., Pomology and Viticulture (Geneva)
- Kennedy, W. Keith, Ph.D., Cornell U. Prof., Agronomy
- Khan, Anwar A., Ph.D., U. of Chicago. Prof., Seed and Vegetable Sciences (Geneva)
- Kinsella, John E., Ph.D., Penn State U. Prof., Food Science
- Knapp, Warren W., Ph.D., U. of Wisconsin. Assoc. Prof., Agronomy
- Knapp, Wayne R., Ph.D., Purdue U. Assoc. Prof., Agronomy
- Knoblach, Wayne A., Ph.D., Michigan State U. Asst. Prof., Agricultural Economics
- Korf, Richard P., Ph.D., Cornell U. Prof., Plant Pathology
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- Kramer, John P., Ph.D., U. of Illinois. Prof., Entomology
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- White, Shirley A., Ph.D., Michigan State U. Prof.,
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- Wien, Hans C., Ph.D., Cornell U., Asst. Prof.,
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- Wilkins, Bruce T., Ph.D., Cornell U. Prof., Natural
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- Young, Robert J., Ph.D., Cornell U. Prof., Animal
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- Young, Roger G., Ph.D., U. of Oregon. Assoc. Prof.,
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- Zitter, Thomas A., Ph.D., Michigan State U. Assoc.
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Asst. Prof., Plant Breeding and Biometry/Agronomy

College of Architecture, Art, and Planning

Administration

Jason Seley, dean
 Ian R. Stewart, associate dean
 Wendy Phoenix, director of administrative services
 John M. Crowley, 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
 Sidney Saltzman, chairman, 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 four 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 related programs, 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 sixty, 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 transfers to 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 which 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 106,000 books, is capable of supporting undergraduate, graduate, and research programs. Some 1,800 serials are currently received and maintained.

A slide library is maintained in Sibley Hall and contains extensive files of architectural history slides and a large and growing collection of slides of art and architecture from all parts of the world. The library now includes approximately 250,000 slides.

The facilities of the libraries of other schools and departments on campus and the 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 and Sibley Dome Galleries. 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 other time has been well spent since suspension, and, if employed, must submit a letter from an immediate superior. Readmission to the college after being suspended is at the discretion of the Admissions Committee.
- 4) *Dismissed: May Not Reregister, College of Architecture, Art, and Planning* The student is dismissed from the college and is permanently prohibited from continuing studies in it. This dismissal does not preclude the possibility of applying for admission to another division of the University.

The above actions are not necessarily sequential. A student who has received a warning may be suspended for academic deficiency at the end of the next term if the performance during that time is deemed to be grossly deficient.

It is necessary to have a cumulative average of at least C- (1.7) for graduation.

Architecture

J. A. Wells, chairman; J. O. Bragstad, P. M. Cohen, R. W. Crump, M. D. Dennis, W. Goehner, D. P. Greenberg, G. Hascup, L. F. Hodgden, A. Kira, B. G. MacDougall, R. D. MacDougall, A. B. Mackenzie, J. C. Miller, L. Mirin, E. K. Morris, C. F. Otto, C. W. Pearman, H. W. Richardson, M. Romanach, C. Rowe, F. W. Saul, M. L. Schack, M. Schler, A. Senkevitch, J. P. Shaw, D. M. Simons, O. M. Ungers

Professional Degree Program

The first professional degree in architecture is the Bachelor of Architecture. This degree counts toward the professional registration requirements established by the various states and the National Council of Architectural Registration Boards. The professional program is normally five years in length and is designed particularly for people who, before they applied, had established their interest and motivation to enter the field. It therefore incorporates both a general and professional educational base.

The program is oriented towards 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 toward the Bachelor of Architecture degree also 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., with permission of the program director. Courses offered by Cornell include design, introduction to the thesis, special problems in architectural design, a professional seminar, and a professional studies course. Students are encouraged to enroll for additional courses at local institutions. The Cornell facilities in Washington are in an excellent location adjoining DuPont Circle. 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. Tuition is pro rated for students in this program.

Curriculum

First Year

Fall Term	Credits
101 Design I	6
131 Introduction to Architecture	2
141 History of Architecture I	3
151 Design Fundamentals I	2
191 Drawing I	2
Out-of-college elective	3
	18

Spring Term	Credits
102 Design II	6
142 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	Credits
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	Credits
202 Design IV	6
222 Structural Concepts	4
232 Design Methods and Programming	2
261 Introduction to Environmental Science	3
College elective	3
	18

Third Year

Fall Term	Credits
301 Design V	6
321 Structural Systems I	3
361 Environmental Controls I	3
Out-of-college elective	3
Departmental elective	3
	18

Spring Term	Credits
302 Design VI	6
322 Structural Systems II	3
362 Environmental Controls II	3
Out-of-college elective	3
Departmental elective	3
	18

Fourth Year

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

Spring Term	Credits
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	Credits
501 Design IX	6
or 503 Design IX—Thesis I	8
or 601 Special Program	9
510 Thesis Introduction	3
Out-of-college elective	3
Departmental elective	3
Out-of-college elective	3
	18, 20, or 21

Spring Term	Credits
502 Design X—Thesis	8
or 504 Design X—Thesis II	8
or 602 Special Program	9
College or out-of-college electives (two courses)	6
Departmental elective	3
	17 or 18
Total credits	178

Elective Distribution Requirements

	Credits
Departmental electives	18
College or out-of-college electives	9
College electives	9
Out-of-college electives	27
Total electives	<hr/> 63

Departmental Elective Distribution Requirements

	<i>Credits</i>
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 which has not been covered by equivalent work. If the applicant has had no previous work in architectural design, the ten-term design sequence must be completed. Since this sequence may be accelerated by attending summer terms, seven or eight normal 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.

A limited number of transfer applicants who have completed a portion of their architecture studies in other schools are offered admission. Each applicant's case is individually considered. Transfer students must complete a minimum of four terms in residence and a minimum of 70 credits of which 35 must be taken in the Department of Architecture, including four terms of design. Placement in the design sequence is based on a review of a representative portfolio of previous work.

Nonprofessional Alternative Program

After completing the first four years of requirements, the student may choose to receive the nonprofessional degree of Bachelor of Fine Arts (B.F.A.) in architecture.

The first two years of the professional program are considered a basic introduction to the field. It is possible after this phase to depart from the professional program to develop a concentration in some area of the broader field without the intention of becoming a licensed practicing architect. A student choosing an undergraduate nonprofessional major should apply in writing by February 1 in the second year to the department chairperson. The student will be interviewed and informed about acceptance by March 1.

A program developing a major concentration in the third and fourth years leading to the nonprofessional Bachelor of Science degree in history of architecture

and urban development is available. A student attaining this degree can either terminate studies or apply to a graduate program in that area of concentration.

History of Architecture and Urban Development

The major in history of architecture and urban development is intended for undergraduate students interested in historical studies of architecture and planning offered in the context of a professional school. The program benefits from a tradition of pioneer work in the history of architecture and urban development that has grown at Cornell for several decades. Special features of the major are the availability of work in preservation planning. Fourteen 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 141 and 142 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 College of Arts and Sciences.

Honors program. Students who want to enroll in the honors program must indicate their intention in writing before the end of their junior year and be accepted for the program by the history of architecture faculty. Minimum requirements for admission to candidacy for honors are:

- 1) a cumulative average of B— or better in all courses;
- 2) a cumulative average of B or better in all history of architecture and urban development courses.

Honors candidates will take a 4-credit research course in the fall of their senior year. In the spring there will be a 4-credit session during which they will prepare and defend an architectural history presentation or demonstration, or a paper approximately fifty pages long.

Curriculum. Students must have already completed the first two years of the Bachelor of Architecture curriculum, for a total of 70 credits.

<i>Third Year, Fall</i>	<i>Credits</i>
Fine art elective	3
Related field courses	4
History of architecture (intermediate level) or history of urban development	4
Electives	4
	15

<i>Third Year, Spring</i>	
Related field courses	4
History of architecture (intermediate level) or history of urban development	4
Electives	8
	16

<i>Fourth Year, Fall</i>	
History of architecture (advanced level) or history of urban development	4
Honors or history related subject	4
Electives	8
	16

<i>Fourth Year, Spring</i>	
History of architecture (advanced level) or history of urban development	4
Honors or history-related subject	4
Electives	7
	15

Students complete a total of 132 credits.

Summer Term in Architecture

The summer term offers students the opportunity of a concentrated period of design work. Design is offered at both undergraduate and graduate levels; the term is six to eight weeks in duration.

Undergraduate design sequence courses are offered at second- through fifth-year levels in Ithaca. Normally, there is also a design program abroad for third-, fourth-, and fifth-year students.

Registration is limited to students in good standing who have completed the sophomore year of study. In exceptional cases a student who has completed only one year of study may be allowed to register.

Students from schools of architecture other than Cornell are welcome to apply to the college for admission to any summer programs.

At the graduate level, the summer term is devoted to problems forming part of the student's program of work. The term may carry residence credit equal to that of a normal academic term. Participation in the program cannot be undertaken without the consent of the student's Special Committee.

Architectural Design

A studio fee of \$10 is charged each semester for every design course.

Sequence Courses

101 Design I Fall. 6 credits. Limited to department students.

Studios and lecns, 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 lecns, 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. Studios and sems, M W F 2–6. Staff. Programs in architectural design, urban design, or architectural technology and environmental science are offered each term.

501 Design IX Fall or spring. 6 credits. Studios, M W F 2–6. Staff.

502 Design X—Thesis Fall or spring. 8 credits. Required of all students who are candidates for the B.Arch degree, who must satisfactorily complete a

thesis during one term of their last year in residence. Students accepted for admission to the graduate studio are exempt from the thesis requirement. Studios, M W F 2–6. Staff.

503–504 Design IX—Thesis I and Design X—Thesis II Fall or spring. 8 credits each term. Prerequisite: permission of department.

Studios, M W F 2–6. Staff. Students who have obtained approval may elect to spend two terms working on the thesis.

510 Thesis Introduction Fall or spring. 3 credits. Required of all architecture students in the year preceding their thesis.

Lec and sem, R 1:25–3:20. Staff. Lectures, seminars, and independent research leading to complete development of the student's thesis program. General instruction in the definition, programming, and development of a thesis is followed by tutorial work with the student's advisory committee.

601–602 Special Program Fall or spring. 9 credits each term. Limited to students applying to a graduate program in the department who have completed an application to the Graduate School. Registration by petition only.

111–112 Elective Design Studio 111, fall; 112, spring. 6 credits each term. Limited to students from outside the department. Prerequisite: permission of department office. Coordinated by the Department of Architecture office. M W F 2–6. Staff.

200, 300, 400, 500 Elective Design Fall or spring. 6 credits each term. Open by permission to transfer students who have not been assigned to a sequence course. Prerequisite: permission of department office. Each student is assigned to a class of appropriate level. M W F 2–6. Staff.

Nonsequence Courses

310 Special Problems in Architectural Design Fall or spring. Registration and credit by arrangement. Hours to be arranged. Staff. Independent study.

[611–612 Urban Housing Developments 611, fall; 612, spring. 2 credits each term. Limited to fourth- and fifth-year students in architecture, and graduate students. Prerequisite: permission of instructor. Not offered 1981–82.

Sem, hours to be arranged. O. M. Ungers. Large-scale housing developments, particularly size, density, and problems of infrastructure.]

613 Transportation Fall. 2 credits. Prerequisite: permission of instructor. No offered 1980–81. Sem, R 3:30–5:30. P. Cohen, A. Meyburg. The impact of various transportation forms on the environment are considered from the perspectives of architects, engineers, planners, and human ecologists. Readings and discussions of past, current, and future transportation modes focuses on aesthetic and physical aspects.

614 Low-Cost Housing Fall or spring. 3 credits. Prerequisite: permission of instructor. Sems, T R 1:25–2:15. F. O. Slate, P. Cohen, C. B. Daniels, 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 1981–82. Hours to be arranged. O. M. Ungers, staff, and guest lecturers.

A broad range of issues and problems of urban and regional development and the context in which the designer functions are surveyed. Selected case studies are presented by the participants and visitors.]

Graduate Courses

711–712 Problems in Architectural Design 711, fall; 712, spring. 9 credits each term.
Studio and sem, hours to be arranged
O. M. Ungers.

The basic first-year design course for graduate students whose major concentration is architectural design.

713–714 Problems in Urban Design 713, fall; 714, spring. 9 credits each term.
Studio and sem, hours to be arranged. C. Rowe.
The 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. O. M. Ungers.
Second-year design course for graduate students whose major concentration is architectural design.

812 Thesis or Research in Urban Design Fall or spring. 9 credits.
Hours to be arranged. C. Rowe.
Second-year design course for graduate students whose major concentration is regional design.

Structures

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.
M F 10:10. F. W. Saul, B. West.
A review of basic mathematics.

Sequence Courses

221 Mathematical Techniques Fall. 3 credits.
Lecs, T R 10:10–11; rec to be arranged.
Mathematics department staff.
Mathematical concepts and operations used in architecture are introduced.

222 Structural Concepts Fall or spring. 4 credits.
Prerequisite: Architecture 221 or approved equivalent.
Lecs and sems, T R 9:05–11. F. W. Saul.
Fundamental concepts of structural behavior. Statics and strength of materials.

321 Structural Systems I Fall. 3 credits.
Prerequisites: Architecture 221 and 222.
Lecs and sems, T R 11:15–1:10. F. W. Saul.
Structural design concepts and procedures for steel building construction.

322 Structural Systems II Spring. 3 credits.
Prerequisite: Architecture 222.
T R 11:15–1:10. F. W. Saul.
Structural design concepts and procedures for reinforced concrete building construction.

Nonsequence Courses

[323 Advanced Steel Building Design Fall. 3 credits. Prerequisites: Architecture 321 and permission of instructor. Not offered 1981–82.
Sems, M W F 10:10–11. F. W. Saul.
Design and investigation of advanced systems of steel building structure, plastic design of continuous beams, rigid frames, and high-rise buildings.]

326 Building Substructure Spring. 3 credits.
Prerequisites: Architecture 322 or concurrent registration and permission of instructor.
Sem, hours to be arranged. F. W. Saul.

The principles of soil mechanics and subsurface exploration. Design of building foundations—footings, piles, and subgrade walls.

Architectural Principles, Theories, and Methods

Sequence Courses

131 Introduction to Architecture Fall. 2 credits.
Open to students in other colleges.
Lec, T 2–4. Staff.

The built and natural environments are introduced as a context for culture. Architecture as an environmental design discipline and its relation to other fields is discussed.

231 Architectural Elements and Principles Fall. 2 credits. Architecture students must register concurrently in Architecture 201.
Studios and lecs, T R 1:30–3:25. Staff.
Theory of the order, perception, and function of architectural space. Discourse on the nature of architectural systems and the multiplicity of ways they can be used to solve architectural problems.

232 Design Methods and Programming Spring. 2 credits. Architecture students must register for this course concurrently with Architecture 202.
Studios and lecs, T R 1:30–3:25. Staff.
Basic methods for developing architectural programs. Programming as a conceptual as well as a descriptive task is emphasized. Basic methods of design. Analytic and synthetic skills are stressed.

Nonsequence Courses

331 Special Problems in Principles, Theories, and Methods Fall or spring. Registration and credit by arrangement.
Hours to be arranged. Staff.
Independent study.

333–334 (also Computer Science 417–418) Computer Graphics 333, fall; 334, spring. 4 credits.
Prerequisites: two terms of calculus and Computer Science 211, or equivalent.
T R 9:05–9:55. D. P. Greenberg.
Introduction to the principles of interactive computer graphics, including input techniques, display devices, display files, interactive graphic techniques, two- and three-dimensional computer graphics, perspective transformations, hidden line and hidden surface algorithms, and color picture generation.

335–336 Theory of Architecture 335, fall; 336, spring. 3 credits each term. Prerequisite: Architecture 231–232 or permission of instructor.
Lecs, T R 4:40–6:30 p.m. L. Hodgden.

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

437–438 Special Projects in Computer Graphics 437, fall; 438, spring. Variable credit. Limited to third-year students and above. Prerequisites: Architecture 334 plus concurrent registration in Computer Science 314 or equivalent, and permission of instructor.
Hours to be arranged. D. P. Greenberg.
Advanced work in computer graphics input and display techniques, including storage tube, dynamic vector, and color raster displays.

[531–532 Computer-Aided Structural Design 531, fall; 532, spring. 4 credits each term. Limited to fourth-year students and above. Prerequisites: Architecture 334 and Engineering CEE G301–G302, Structural Engineering, concurrent registration in CEE G612 Advanced Structural Analysis, and permission of instructor. Not offered 1981–82.

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, and one year of college physics, and permission of instructor. Not offered 1981–82.
Staff.

Advanced topics involving interactive computer graphic and advanced environmental design techniques. Topics may include acoustics, lighting, and energy analyses.]

635 Critical Theory in Architecture Fall or spring. 3 credits. Prerequisite: permission of the instructor.
Hours to be arranged. E. K. Morris.
An inquiry into the fundamental principles of architectural criticism, in theory and practice, with emphasis on the philosophical problems involved.

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

[639 Principles of Design Process Fall. 3 credits. Limited to third-year architecture students and above; students in other colleges must have permission of instructor. Not offered 1981–82.
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.

Architectural History

Sequence Courses

141–142 History of Architecture I and II 141, fall; 142, spring. 3 credits each term. Students in other colleges may take either or both terms for credit.
Lecs, T R 11:15–1:10. C. F. Otto and staff.
History of architecture as social and cultural expression of Western civilization. Selected examples from Mesopotamia to the eighteenth century are considered in 141; history of modern architecture is discussed in 142.

Nonsequence Courses

[244 History of Preindustrial Building Spring. 4 credits. Not offered 1981–82.
Lecs, hours to be arranged. Staff.
The development of traditional architectural elements and forms, materials, methods, and design expression.]

[340 Architecture of the Ancient Near East Spring. 3 credits. Prerequisite: Architecture 141 or permission of instructor. Not offered 1981–82.
Lecs, hours to be arranged. Staff.
Architecture of the oldest historic civilizations associated with Western tradition. Emphasis on Egypt, Mesopotamia, and Anatolia.]

341 Architecture of the Classical World Fall. 3 credits. Prerequisite: Architecture 141 or permission of instructor.
T R 9:05–11. Staff.
Architecture of the ancient Mediterranean civilizations, with emphasis on Greece and Rome.

342 Russian Architecture Spring. 3 credits.
T R 9:05–11:00. A. Senkevitch.
A survey of Russian architecture and city planning

from the late tenth century to the present, with consideration of foreign influences and parallel developments.

343 (also CRP 460) Introduction to the History of Urban Planning Fall. 3 credits.

T R 9:05–9:55, W 2:30–3:20. Staff.
Survey of urban planning in Western civilization from the Greeks and Romans through medieval Renaissance, and modern Europe and colonial and nineteenth-century America.

[344 Islamic Architecture 3 credits. Prerequisite: permission of the instructor. Lec, hours to be arranged. Not offered 1981–82.]

345 Nineteenth-Century Architecture Spring. 3 credits. Prerequisites: Architecture 141–142 or permission of instructor.

Hours to be arranged. A. Senkevitch.
An examination of architectural developments in the nineteenth century, with emphasis on the rationalist tradition developed in France and the picturesque tradition developed in England.

346 The Renaissance Fall or spring. 3 credits. Prerequisites: Architecture 141–142 and permission of instructor.

Lecs, T R 9:05–11. C. F. Otto.
European architecture and city planning of the fifteenth and sixteenth centuries.

347 The Baroque Fall or spring. 3 credits. Prerequisites: Architecture 141–142 and permission of instructor.

Lecs, T R 9:05–11. C. F. Otto.
European architecture and city planning of the seventeenth and eighteenth centuries.

348 American Architecture I and II Fall and spring. 3 credits. Prerequisites: Architecture 141–142 or permission of instructor.

Lecs, M W 10:10–12:05. Staff.
Fall: Building in the United States from the colonial period through 1860. Spring: Building after 1860.

349 Modern European Architecture Fall. 3 credits. Prerequisite: permission of instructor.

M W 11:15–1:10. C. F. Otto.
A survey of nineteenth- and twentieth-century architecture and city planning in Europe.

442 Historical Seminars in Architecture Fall or spring. 2 credits. Prerequisite: permission of instructor.

Hours to be arranged. Staff.
Using historical evidence, students prepare papers discussing problems relating to design or architecture.

445 Special Investigations in the History of Architecture Fall or spring. Variable credit. Prerequisite: permission of instructor.

Hours to be arranged. Staff.
Independent study.

[447 History Workshop Fall or spring. Variable credit. Sem, hours to be arranged. Staff. Not offered 1981–82.]

448 Lectures in Architectural History Fall or spring. Variable credit. Prerequisite: permission of instructor.

Lec, hours to be arranged. Staff.
A series of one or two lectures a week on topics related to architectural history.

542 (also CRP 461) Methods of Archival Research Spring. 3 credits.

Lec, R 10:10–12:05. K. C. Parsons.
Examination of methods for research in the history of architecture and urban development, using archival materials and such as manuscripts, drawings, correspondence, and documents in the Cornell University archives and regional history collections.

543 Measured Drawing Fall. 3 credits. For undergraduate architecture students and graduate students in history and preservation. Prerequisite: permission of instructor.

W 11:15–3:30. M. A. Tomlan, J. P. Shaw.
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 (also CRP 563) Problems in Contemporary Preservation Practice Fall or spring. Variable credit.

Sem, T 2:30–4:25. M. A. Tomlan, T. Werbizky.
A review and critique of preservation planning projects selected to indicate the range of current approaches.

545 (also CRP 562) Perspectives on Preservation Fall or spring. 3 credits.

T 12:20–3:20. M. A. Tomlan.
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 (also CRP 560) Documentation for Preservation Planning Spring. 3 credits.

M 2:30–5:30. M. A. Tomlan.
Methods of collecting, recording, processing, and analyzing historical architectural and planning materials.

547 Preservation Planning Workshop Fall or spring. 4 credits.

Sem, hours to be arranged. Staff and lecturers.
Seminar with visiting professionals, readings, and reports.

548 Problems in Modern Architecture Spring. 2 credits. Prerequisite: permission of instructor.

Lec, hours to be arranged. Staff.

[640 Seminar in Architecture of the Ancient Near East Fall. 4 credits. Prerequisite: Architecture 340 or permission of instructor. Not offered 1981–82.

Staff.
Problems in Near Eastern architectural history.]

641 Seminar in Architecture of the Classical World Spring. 4 credits. Prerequisite: Architecture 341 or permission of instructor.

Hours to be arranged. Staff.
Problems in Greek and Roman architectural history.

645 (also CRP 564) Building Materials Conservation Fall or spring. 3 credits. Limited to upperclass and graduate students.

Lec, hours to be arranged. 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.

646 Seminar in the Renaissance Spring. 4 credits. Prerequisite: Architecture 346 or permission of instructor.

Sem, hours to be arranged. C. F. Otto.
Historical problems of European architecture and city planning of the fifteenth and sixteenth centuries.

647 Seminar in the Baroque Spring. 4 credits. Prerequisite: Architecture 349 or permission of instructor.

Sem, hours to be arranged. C. F. Otto.
Historical problems in European architecture and city planning of the seventeenth and eighteenth centuries.

648 Seminar in the History of American Architecture Fall or spring. 4 credits. Prerequisite: permission of instructor.

M 12:20–2:15. Staff.

Investigation, by means of readings, lectures, and reports, of historical problems in architecture of the nineteenth and twentieth centuries in the United States.

649 Seminar in the History of Modern Architecture Fall or spring. 4 credits. Prerequisite: permission of instructor.

Sem, hours to be arranged. Staff.
Problems in modern art and architecture.

Graduate Courses

740 Informal Study in the History of Architecture Fall or spring. Variable credit. Prerequisite: permission of instructor.

Hours to be arranged. Staff.
Independent study.

741 Seminar in the History of Architecture and Urban Development Fall or spring. 4 credits.

Sem, hours to be arranged. C. F. Otto and staff.
Motives, methods, and resources for scholarly work in history of architecture and history of urban development. Discussions, readings, and reports.

840 Thesis in Architectural History Fall or spring. Variable credit.

Hours to be arranged. Staff.
Independent study for the master's degree.

940 Dissertation in Architectural History Fall or spring. Variable credit.

Hours to be arranged. Staff.
Independent research by candidates for the doctoral degree.

Design Communication

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

251–252 (also Art 161–162) Introductory Photography 251, fall; 252, spring. 3 credits each term. Darkroom fee, \$30.

T R 3:25–6:30. Staff.
For course description, see Art 161–162.

351 (also Art 261) Second-Year Photography Fall. 3 credits. Prerequisite: Architecture 251 or 252, or Art 161 or 162, or permission of instructor.

Darkroom fee, \$30.
T R 9:05–12:05. S. Bowman.
For course description, see Art 261.

352 (also Art 262) Second-Year Photography Spring. 3 credits. Prerequisite: Architecture 251 or 252, or Art 161 or 162, or permission of instructor.

Darkroom fee, \$30.
T R 9:05–12:05. Staff.
For course description, see Art 262.

353 Large-Format Architectural Photography Spring. 3 credits. Prerequisites: Architecture 251 or 252, or Art 161–162, or permission of instructor.

Darkroom fee, \$30.
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 152 or permission of instructor.

Lec and studio, hours to be arranged. Staff. Design and preparation of materials for reproduction in print media. Studio in typography, available printing processes, and photomechanical methods of reproduction.

[356 Architectural Simulation Techniques

Spring. 3 credits. Prerequisite: Architecture 152 or permission of instructor. Not offered 1981–82.

Lec and studio, hours to be arranged. G. Hascup. Two- and three-dimensional simulation techniques in architecture. Emphasis on simulation of environment, space, materials, and lighting as visual tools for architectural design.]

457 Special Project in Photography Fall or spring. Variable credit. Prerequisites: written proposal outlining the special project and permission of instructor. Darkroom fee, \$30.

Hours to be arranged. Staff. Independent study.

458 Special Project in Design Communication

Variable credit. Prerequisite: written proposal outlining the special project and permission of instructor. Darkroom fee, \$30.

Hours to be arranged. Staff. Independent study.

Architectural Science and Technology

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 Introduction to Environmental Science

Fall or spring. 3 credits.

Lecs, M W F 11:15. M. Schiler.

The basic principles involved in inventory and analysis techniques as they relate to design implementation in the outdoor environment. Case studies depicting application of these principles at all scales of land planning and design are presented.

262 Building Technology, Materials, and Methods

Fall or spring. 3 credits. Prerequisites: Architecture 162 and 261.

Lecs, M W 11:15–1:10. R. Crump.

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 I

Fall or spring. 3 credits each term. Prerequisite: Architecture 262.

Lecs, M W F 10:10. R. Crump.

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 II

Fall or spring. 3 credits each term. Prerequisite: Architecture 361.

Lecs, M W 10:10. M. Schiler.

Energy conservation. Passive solar design. HVAC distribution systems.

Nonsequence Courses

371 Environmental Technology Workshop I

Fall. 2 credits. Prerequisite or corequisite: Architecture 361.

Studio, hours to be arranged. R. Crump.

The mechanical engineer's task and its relation to the architectural design process. Full-scale and model studies of the role of air movement and temperature in building design. Passive and active solar energy design.

372 Environmental Technology Workshop II

Spring. 2 credits. Prerequisite or corequisite: Architecture 362.

Studio, hours to be arranged. R. Crump.

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.

561–562 Special Problems in Architectural Science

561, fall; 562, spring. Variable credit.

Prerequisite: permission of science staff instructor.

Hours to be arranged. Staff.

Independent study.

662 Environmental Control Systems

Spring. 3 credits. Lecture and seminar. Prerequisite: Architecture 362.

Hours to be arranged. R. Crump.

The influences of the environment on the design of buildings and urban developments. Lecture and workshop exercises use the wind tunnel and artificial sun.

667–668 Architecture in Its Cultural Context I and II

667, fall; 668, spring. 4 credits each term.

Prerequisite: permission of instructor.

Sem, M W F 11:15. B. MacDougall.

Fall term, theory; spring term, problem solving and method. An examination of the relationship between architecture and other aspects of culture. Emphasis on the motivations for particular architectural forms, and especially on theories of architecture. Examples from the United States and Asia.

Graduate Courses

761–762 Architectural Science Laboratory

761, fall; 762, spring. Variable credit. Open to graduate students only.

Hours to be arranged. Staff.

Projects, exercises, and research in the architectural sciences.

763–764 Thesis or Research in Architectural Science

763, fall; 764, spring. Variable credit.

Limited to graduate students.

Hours to be arranged.

Independent study.

The Profession of Architecture

Sequences Courses

481 Professional Practice

Fall or spring. 3 credits each term.

T 1:25–3:20. 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.

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.

Washington, D.C., Field 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 this program. Students must obtain permission of the program director. Courses offered include Design, Thesis Introduction, Special Problems in Architectural Design, plus the courses listed below. Other course offerings may be available.

480 Professional Studies

Fall or spring. 2 credits. Lec, hours to be arranged. M. Schack and visiting lecturers.

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.

530 Professional Seminar

Fall or spring. 1 credit each term.

Hours to be arranged. Staff and visiting critics.

Art

S. Bowman, chair; Z. Blum, V. Colby, J. Cole, N. D. Daily, J. Locey, E. Meyer, E. Mikus, G. Page, S. Poleskie, J. Seley, A. Singer, J. L. Squier, J. Valerio, P. Webb, 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 painting, sculpture, photography, and the graphic arts 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 the concept of accelerated graduation. However, a student may petition for consideration of early graduation upon the following terms and conditions: (1) the petition must be submitted to the faculty before course enrollment

in the spring semester of the student's junior year, and (2) the student must have a cumulative average that places him or her in the first quarter of the class.

A candidate for the B.F.A. degree who also wants to earn a Bachelor of Arts degree from the College of Arts and Sciences can arrange to do so. This decision should be made early in the candidate's career (no later than the third semester) so that he or she can petition to be registered in both colleges simultaneously. Each student is assigned an adviser in the College of Arts and Sciences to provide needed guidance. Those students who are interested primarily in the history rather than in the practice of art should apply for admission to the College of Arts and Sciences with the objective of pursuing a major in the Department of History of Art in that college. Department of Art studio courses may then be taken as electives.

Curriculum

First Year

Fall Term	Credits
111 Introductory Art Seminar	1
151 Introductory Drawing	3
110 Color, Form, and Space	3
121 Introductory Painting	3
141 Introductory Sculpture	3
Out-of-college elective	3
	16

Spring Term

122 Introductory Painting	3
142 Introductory Sculpture	3
152 Introductory Drawing	3
162 Introductory Photography	3
B.F.A. students must take one of the following three courses:	
132 Introductory Intaglio Printing	3
134 Introductory Silk-Screen Printing	3
136 Introductory Lithography	3
Out-of-college elective	0-3
	15-18

Second Year

Fall Term	
251 Second-Year Drawing	3
131, 133, or 135, courses in graphic arts	3
261 Second-Year Photography	3
Departmental electives	0-6
Out-of-college electives	3-9
	15-18
Spring Term	
252 Second-Year Drawing	3
Departmental electives	0-6
Out-of-college electives	3-9
	15-18

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, graphics, or photography. Or, they should plan to complete 20 credits in each of two of the above areas. An additional 12 credits in history of art at the 200 level or higher or in architectural history must also be completed. Students are expected to take 32 credits in their third and fourth years respectively.

The B.F.A. program is designed so that students may fulfill the degree requirement of 130 credits with a minimum of 66 credits taken in the Department of Art and a minimum of 50 credits taken outside of 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, four courses must be in English, history, or other humanities offered in the College of Arts and Sciences. In the first two years 6 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.

2) Of the minimum of 66 credits to be taken within the Department of Art, the following courses must be completed in the first two years: 110 Color, Form, and Space; 111 Introductory Art Seminar; 151-152 Introductory Drawing; 251-252 Second-Year Drawing. The following sequences must also be completed in the first two years: 121-122 Introductory Painting; 141-142 Introductory Sculpture; 162 Introductory Photography; and 261 Second-Year Photography. Students must also take two of the following three courses by the end of the third semester: 131-132 Introductory Intaglio Printing, 133-134 Introductory Silk-Screen Printing, 135-136 Introductory Lithography. Art 310, Issues in Contemporary Art, must be taken in the first semester of the junior year.

The University requirement of two terms in physical education must be met.

A candidate for the B.F.A. degree at Cornell is required to spend the last two terms of candidacy in residence at the University subject to the conditions of the Cornell faculty legislation of November 14, 1962.

Students who transfer into the undergraduate degree program in art must complete a minimum of four terms in residence at Cornell and a minimum of 60 credits at the University, of which 30 credits must be taken in the Department of Art, including four terms of studio work.

Course Information

Most courses in the Department of Art are open to students in any college of the University who have fulfilled the prerequisites and who have permission of the instructor.

Fees are charged for all Department of Art courses. For fine arts majors, the fee is \$20 each semester. Students from outside the department are charged \$10 a course.

Courses in Theory and Criticism

110 Color, Form, and Space Fall or spring. 3 credits. Fall enrollment limited to B.F.A. candidates. M 9:30-11. N. Daly.

A study of traditional and contemporary ways of drawing and painting. An analysis of color theory and pictorial space.

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.

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. Fall, J. Cole; spring, Z. Blum. 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; 122, spring. 3 credits each term.

121: sec 1, T R 1:25-4:25; sec 2, T R 9:05-12:05; sec 3, T R 1:25-4:25. 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.

221: T R 1:25-4:25. Staff.

Study of traditional and contemporary media.

321 Third-Year Painting Fall. 4 credits.

Prerequisite: 9-12 studio credits, depending on major.

T R 9:05-12:05. J. Valerio.

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.

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.

T R 9:05-12:05. J. Valerio.

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.

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. 3 credits each term.

Fall: T R 9:05-12:05. Spring: T R 12:20-3:20.

E. Meyer.

A basic introduction to etching techniques with emphasis on engraving, lift ground, relief printing, monotypes, and experimental techniques.

133-134 Introductory Silk-Screen Printing 133, fall; 134, spring. 3 credits each term.

Fall: T R 9:05-12:05; spring: T R 12:20-3:20.

S. Poleskie.

A basic introduction to fine-art silk-screen printing. Students explore the use of lacquer film, paper stencil, tusche and glue, and other commonly used procedures of serigraphy.

135-136 Introductory Lithography 135, fall; 136, spring. 3 credits each term.

Fall and spring: M W 9:05-12:05. 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 or permission of instructor.

Fall: T R 1:25-4:25; spring: T R 9:05-12:05.

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.

Fall: T R 1:25-4:25; spring: T R 8-11. 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.

Fall and spring: M W 1:25-4:25. 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.
Fall: T R 1:25-4:25. 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; 142, spring. 3 credits each term.
Sec 1, M W 8-11; sec 2, T R 8-11; sec 3, T R 3:35-6:35. 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 141-142.

Sec 1, W F 1:25-4:25; sec 2, T R 1:25-4:25. 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.

Sec 1, W F 1:25-4:25; sec 2, T R 1:25-4:25. 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.
Staff.
Continuation and expansion of Art 341.

441 Fourth-Year Sculpture Fall. 6 credits.

Prerequisite: Art 342.

Sec 1, W F 1:25-4:25; sec 2, T R 1:25-4:25. 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.

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

161-162 (also Architecture 251-252) Introductory Photography 161, fall; 162, spring. 3 credits each term. Darkroom fee, \$30.

T R 2:30-5:30. J. Locey.
A basic lecture-studio course in black and white photography for beginners. Emphasis is on basic camera skills, darkroom techniques, and understand photographic imagery.

261 (also Architecture 351) Second-Year Photography Fall. 3 credits. Prerequisite: Art 161 or 162 or permission of instructor. Darkroom fee, \$30.

Fall: M W 1:25-4:25. S. Bowman.
A studio course in color photographic processes, including color toning and hand coloring of black and white prints, and color printing. Emphasis is on camera skill, color techniques, image content, and creative use of color photography.

262 (also Architecture 352) Second-Year Photography Spring. 3 credits. Prerequisite: Art 161 or permission of instructor. Darkroom fee, \$30.

T R 9:05-12:05. J. Locey.
A studio course in black and white or color photography. Emphasis is on advanced camera and darkroom skills, image content, and creative use of black and white photography.

263 Photo Processes Fall or spring. 3 credits each term. Prerequisite: Art 161 or 162 or permission of instructor. Darkroom fee, \$30.

Hours to be arranged. Staff.
A studio course in early photo and nonsilver processes. Emphasis is on camera skill, basic techniques and processes, image content, and creative use of photo processes.

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: Art 261 and 262 or permission of instructor. Darkroom fee, \$30.

Fall: T R 9:05-12:05, J. Locey. Spring: T R 2:30-5:30, S. Bowman.
Continued study of creative use of photography with emphasis upon specialized individual projects.

461-462 Fourth-Year Photography 461, fall; 462, spring. 6 credits each term. A studio course intended for photography majors and other qualified students. Prerequisite: Art 361 and 362 or permission of instructor. Offered only for students who enter in the fall of 1977. Darkroom fee, \$30.

Fall: T R 9:05-12:05, J. Locey. Spring: T R 2:30-5:30, S. Bowman.
Continued study of creative use of photography leading to thesis exhibition.

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; 152, spring. 3 credits each term.

151: sec 1, M W 1:25-4:25; sec 2, T R 8-11; sec 3, T R 1:25-4:25.
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.

251: sec 1, M W 9:05-12:05; sec 2, M W 9:05-12:05. 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. Staff. Not offered 1981-82.]

Graduate Thesis

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

Special Studio Courses

370 Independent Studio in Painting Fall or spring. Credit as assigned; 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; 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; 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; 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; may be repeated for credit. Prerequisite: written permission of instructor.
Hours to be arranged. Staff.
Advanced studio concentration in drawing.

City and Regional Planning

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

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 department focus on a broad range of issues which are often subsumed under the labels urban, regional, or social policy planning. There is clearly a

considerable overlap among these three areas of professional and scholarly study, and the department encourages the integration of related planning activities.

Urban planning is generally concerned with the urban environment, the physical facilities as well as social and economic forces that affect this environment, and the processes of urban plan making and administration.

Regional planning is usually concerned with socioeconomic issues and functional planning at the regional level, the forces that generate economic growth and social development, and the ways in which resources can best be used in regional development.

Social policy planning is generally concerned with the social decision processes involved in both city and regional planning.

International planning is an additional area in which the department offers a range of courses and activities which involve United States citizens and foreign nationals.

The programs of study are primarily at the graduate level; however, an undergraduate program in urban and regional studies offers students completing their first two years in areas of study such as social sciences, design, the humanities, or engineering an opportunity to redirect their education toward an academic understanding of the various social, political, economic, and environmental issues facing cities and regions. For further information consult the department chairman, Professor Saltzman, 105 West Sibley Hall.

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 and/or first-year courses; those numbered from 700–799 and 800–899 are generally considered to be more advanced courses. Upperclass undergraduate courses are numbered from 300–499. (Undergraduates with the necessary prerequisites and permission of the instructor may enroll in courses numbered 500 and above.) (b) Courses are grouped (by the tens digit of the course number) to represent the underlying structure of the planning curriculum as follows: theory and quantitative methods (0, 1, 2), program areas (3, 4, 5), and interprogram topics (6, 7, 8, 9).

The department attempts to offer courses according to the information that follows; however, students should check with the department at the beginning of each semester for the latest changes.

Urban and Regional Theory

[200 Contemporary Issues in Urban and Regional Studies] Spring. 4 credits. Prerequisite: one course in either government, economics, or sociology. Not offered 1981–82.

Staff.
An interdisciplinary course exploring at an introductory level theories of the development and spatial patterning of cities and regions and the political and economic interactions with them. Emphasis is on the relationships between these theories and current social and urban issues.]

400, 500 Introduction to Urban and Regional Theory Spring. 4 credits. A first-year graduate course, open to juniors and seniors.
T 2:30–5:30. 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.

402 Spatial Analysis of Urban and Regional Systems I Fall. 4 credits.

Staff.
Introductory review of theories dealing with the spatial distribution of population and economic activity drawn from various social science disciplines, such as geography, economics, and sociology.

403 Spatial Analysis of Urban and Regional Systems II Spring. 4 credits. Prerequisite: CRP 402.

A detailed, in-depth review of recent research dealing with such topics as population distribution, migration, location of industry and economic activity, and the spatial organization of urban and regional social systems.

600 Urban Economics Spring. 4 credits. Prerequisite: basic economics.

T 10:10–12:05. S. Czamanski.
Urban phenomena are analyzed from an economic point of view using methods of economic analysis. 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 policy. Some time will be spent in discussing problems of cities in developing countries.

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 CRP 800, concentrating on recent developments.

809 Informal Study in Urban and Regional Theory Fall or spring. Credit as assigned.

Staff.

Planning Theory and Politics

413 Planning and Political Economy I Fall. 4 credits.

Staff.
This course deals with Marx's methodological approach and his elaborations in volume I 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.

414 Planning and Political Economy II Spring. 4 credits.

Staff.
This course covers the economic formulations Marx expounded in volumes II and III of *Capital* and in *Theories of Surplus-Value*, as well as current contributions on the different ensuing debates. Topics cover 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. The end of the course treats the division of profits into profits of enterprise, interest, and, in particular, ground rent. Students must have read volume I of *Capital* and be generally familiar with Marx's approach.

510 Introduction to Planning Theory Spring. 3 credits.

T 1:25–3:20. P. Clavel.
Normative and behavioral models of decision making for the provision of public goods and services. Theories of individual decision and choice are reviewed, followed by applications in institutional contexts stressing the impact of alternative organizational and political models of social decision processes.

511 Introduction to Planning Fall. 4 credits.

M W F 10:10–11. P. Clavel.
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.

[612 Urban Politics and Planning] Spring. 3 credits. Not offered 1981–82.

I. R. Stewart.
A consideration of the political dimension of planning and renewal activities. Emphasis on government mandate and structure, as well as interest group and power relationships as they are related to development decision-making processes. Theory and case-study analyses.]

[614 Neighborhood and Community Theory] Spring. 4 credits. Not offered 1981–82.

Staff.
An examination of contemporary social and economic conditions of neighborhoods; community differentiation reinvestment and revitalization policies and practice; community control; and the role of the community in the provision of goods, services, and social support.]

710 Politics of the Planning Process Spring. 4 credits.

W 2:30–4:25. P. Clavel.
Analysis of planning and political institutions in selected subjects and policy areas, relating national and subnational levels. Subjects are drawn from such areas as environmental control and use policy, industrial development, transportation, and community development. Theories of planning and politics are compared for their analytical usefulness in these areas.

711 Planning and Organization Theory Fall. 4 credits.

R 3:35–5:30. P. Clavel.
An examination of organizational and administrative models relevant to plan formation and implementation. Applications are made to such programs as community development, regional administration, urban renewal, and land-use control.

718 Fieldwork or Workshop in Planning Theory and Politics Fall or spring. Credit as assigned.

Staff.
Work on problems in planning theory and politics in a field or laboratory setting or both.

719 Special Topics in Planning Theory and Politics Fall or spring. Credit as assigned. Staff.

810 Advanced Planning Theory Fall. 3 credits. Prerequisite: CRP 500 or 710. F 3:35–5:30. B. G. Jones.
A survey of the works of scholars who have contributed to current thinking about planning theory. Alternative assumptions concerning models of man and theoretical concepts concerning the nature of planning today are considered.

819 Informal Study in Planning Theory and Politics Fall or spring. Credit as assigned. Staff.

Quantitative Methods and Systems Analysis

320 Introduction to Quantitative Methods I Fall. 3 credits. Prerequisite: Mathematics 108 or equivalent, or permission of instructor. T R 10:10–12:05. Staff.

An introduction to the application of quantitative methods to issues in urban and regional studies. Special attention is given to the characterizations, evaluations, and control of evolving processes of urban and regional issues. Emphasis is on methods for the description of physical and social phenomena by mathematical means. Topics include linear and nonlinear deterministic processes, elementary stochastic process, process identification, and simulation.

321 Introduction to Quantitative Methods II Spring. 3 credits. Prerequisite: CRP 320, or permission of instructor. Staff.

Methods for the evaluation and control of process performance. Topics include linear and dynamic programming, single stage and multistage decisions, and elementary statistical decision theory.

520 Mathematical Concepts for Planning Fall. 1, 2, 3, or 4 credits. Prerequisite: permission of instructor. Mathematics 201, Mathematics for the Social Sciences, and Sociology 420, Mathematics for Sociologists, 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.

T R 12:20–2:15; lab to be arranged. P. Brandford.
An introduction to the use of computers in the problem-solving and planning processes. Students run programs using PL/1 or another appropriate programming language. Brief introduction to computer systems and the use of library routines. Advantages and limitations of using computers are considered.

620 Planning Analysis Spring. 4 credits. Prerequisite: CRP 621.

M W F 10:10–11:00; lab, T 2:30–4:25. B. G. Jones.
A survey of commonly used techniques for analyzing various aspects of subnational socioeconomic systems, emphasizing planning applications.

621 Statistical Analysis for Planning Spring. 3 credits. Prerequisites: CRP 520 or equivalent and permission of instructor.

T R 9:05–9:55; lab, T 4:30–5:30. Staff.
An introduction to basic methods of statistical analysis with an emphasis on their use in the decision-making process in planning. Material in decision theory, sampling, estimation, hypothesis testing, and prediction will be introduced.

[622 Planning Information Systems] Fall. 3 credits. Prerequisite: CRP 521 or equivalent. Not offered 1981–82.

T R 3:35–4:25; lab to be arranged. Staff.
The design and use of computer-based information systems for planning and policy analysis, including conventional data processing and advanced data base systems. Technical aspects in the design and structure of such information systems are introduced along with a variety of applications.]

[623 Methods of Social Policy Planning] Spring. 3 credits. Prerequisite: CRP 521 or equivalent. Not offered 1981–82. 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.]

720 Quantitative Techniques for Policy Analysis and Program Management Fall. 4 credits.

M W 9:05–11; lab, W 2:30–3:20. 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. Prerequisites: CRP 621 and 521 or equivalent. Not offered 1981–82.

T R 4:40–5:30. S. Saltzman.
The design and use of simulation models in planning and policy analysis. Various approaches drawn from discrete stochastic simulation, econometric simulation, microanalytic simulation, and urban dynamics are evaluated. Applications in design, land use, regional development, and social policy are considered. Students run their own programs on the Cornell computer.]

722 Decision Analysis for Policy Planning and Program Management Spring. 4 credits.

M W F 9:05; lab, W 12:20–2:15. D. Lewis.
An examination of selected techniques for analyzing complex dynamic decision problems in the planning context. Topics include dynamic programming (deterministic and probabilistic), integer programming, and process simulation (queueing models).

728 Fieldwork or Workshop in Systems Planning and Analysis Fall or spring. Credit as assigned.

Staff.
Work on applied systems planning problems in a field or laboratory setting or both.

729 Special Topics in Quantitative Methods and Analysis Fall or spring. Credit as assigned. Staff.

829 Informal Studies in Quantitative Methods and Analysis Fall or spring. Credit as assigned. Staff.

Regional Development Planning

[430 Regional Economic Development] Fall. 4 credits. Prerequisite: CRP 500. Not offered 1981–82. Staff.

Problems of and theories about development of lagging, underdeveloped, or poor regions in industrial nations, with emphasis on planning implementation.]

[530 Introduction to Regional Development Planning] Fall. 3 credits. Prerequisite: CRP 500. Not offered 1981–82. 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 1981–82.

M 1:25–3:20. P. Clavel.
Administrative institutions relevant to regional development policies, with attention to the United States, Western Europe, and Third World countries. Approaches to theory, measurement, and spatial distribution of institutions are covered with emphasis on the design of effective programs.]

730 Methods of Regional Science Fall. 4 credits. Prerequisites: basic economics and elementary matrix algebra.

T 10:10–12:05. S. Czamanski.
Main quantitative techniques offered in regional planning are covered. Since many methods have multiple applications in planning, the topics are organized around three broad subjects: population and migration studies, regional economic analysis, industrial policies, and interindustry relations.

731 Optimization Techniques in Planning Spring. 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, et cetera. Examination of dynamic systems covers basic control theory, introduction to dynamic programming and its application to regional growth and migration policies, and economic theory of socialism. Elements of calculus of variations and of geometry of vector spaces are covered in optional workshops.

732 Regional Industrial Development Fall. 4 credits. Prerequisites: basic economics and elementary calculus.

W 10:10–12:05. S. Czamanski.
The course focuses on issues of industrial, as distinct from agricultural or regional development. Material includes problems pertinent to developed and developing countries. Relevant parts of the theories of economic growth, international trade, production and technological change, location theory, and formation of industrial complexes are examined. Planning application and case studies are discussed.

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 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. Interregional trade and market and supply area analysis is treated. Particular attention is paid to Loschian and Christaller systems of urban places.

833 Methods of Regional Analysis Spring. 3 credits.

R 1:25–4:25. W. Isard.

Advanced applications of interregional and regional input-output and linear programming techniques to development problems. Applications of spatial interaction and growth (intertemporal) models to the analysis of urban and multiregional systems, with particular reference to environmental quality management.

839 Informal Study in Regional Development Planning Fall or spring. Credit as assigned. Staff.**Social Policy Planning****340 Institutional Decision Processes** Fall. 3 credits.

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 (also Economics 302 and Government 302) The Impact and Control of Technological Change

Cosponsored by the Program on Science, Technology, and Society. Spring. 4 credits.

T R 2:30–4:25. S. Del Sesto.

Social, environmental, and economic implications of technological change in the context of present policies and strategies of control. Several specific cases are considered in detail, followed by investigation of the problems of a modern technological society. Alternative political and economic solutions are explored.

442 (also Sociology 355) Social and Political Studies of Science 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. Focus is on its relationship to government, the media, religion, and education. Drawing from recent controversies, questions of ethics and social responsibility in science, struggles to maintain internal control over research and the teaching of science, and concepts of limits to inquiry are discussed.

[540 Introduction to Social Policy Planning Fall. 4 credits. Not offered 1981–82.

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 (also Government 628 and B&PA NPA 515) The Politics of Technical Decisions I Cosponsored by the Program on Science, Technology, and Society. Fall. 4 credits.

W 2:30–4:25. 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.

[542 (also Government 629 and B&PA NPA 516) The Politics of Technical Decisions II

Cosponsored by the Program on Science, Technology, and Society. Spring. 4 credits. Not offered 1981–82. Prerequisite: CRP 541 or permission of instructors.

Hours to be arranged. D. Nelkin.

A continuation of CRP 541, focusing on decision making in several technical policy areas. Students develop individual or group research projects focusing on policy decisions with a significant technical component and considerable public impact.]

543 Planning, Organizing, and Public Service Delivery Fall or spring. Credit as assigned.

R 10:10–12:05. J. Forester.

An exploration of planners' roles and practices 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 Recurring Themes in Social Policy Planning Spring. Credit as assigned.

J. Forester.

A seminar devoted to the understanding of problems of social policy planners. 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 of services.

642 Critical Theory and the Foundation of Planning Analysis Fall. Credit as assigned.

J. Forester.

Beginning with Weber, Marx, and Durkheim, the fundamental assumptions, theories, and frameworks structuring planning and policy analyses are explored. Positivist, phenomenological, ordinary language, and critical perspectives are considered as they clarify or obscure questions of value, rationality, objectivity, interpretation, and action in public policy contexts.

643 Legal Aspects of Public Administration Fall. 3 credits.

R. Booth.

Examination of basic legal issues that commonly arise in the administration of government agencies, including, for example, agency rule making, protection of individual rights in administrative processes, and judicial review of agency decisions. The course is designed for persons interested in professional careers that will involve working in or with public agencies.

740 Seminar in Social Policy Research and Analysis Spring. 4 credits.

Staff.

Focuses on examining contemporary methods of social policy analysis, including their political implications, and developing multidisciplinary approaches to selected social policy issues. The dilemmas of action research and of implementing research findings are explored.

743 Critical Theory and Public Policy Spring. 4 credits. Prerequisite: background in political or social theory.

M 1:25–3:20. J. Forester.

This seminar explores the critical theory of Jurgen Habermas, particularly its application to problems of planning and public policy analysis. We consider: problems of legitimation, power, rationalization, instrumental and communicative action, ideology, and systematically distorted communications as they appear more broadly in the practice of planners, policy analysts, or professionals.

[744 Urban Financial Planning and Management Spring. 3 credits. Not offered 1981–82.

Staff.

Introduction to the theory and practice of financial management and planning in urban government, including budgeting, capital expenditures, management of short-term assets, borrowing, taxation, and intergovernmental finance. Case studies and problem sets that require the student to make decisions are emphasized.]

[745 Urban Fiscal Analysis Fall. 3 credits.

Prerequisite: CRP 744 or a course in public finance. Not offered 1981–82.

Staff.

Government financial information (fund accounting, financial statements, and budgets) is introduced and this information and other data are used to identify major fiscal problems and their causes faced by cities. Alternative solutions to urban fiscal problems are evaluated using this analysis.]

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 1981–82.

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.

T R 12:20–1:10. S. Stein.

Surveys, analyses, and plan-making techniques for guiding physical expansion and renewal 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. 2 credits. Prerequisite: CRP 552 or permission of instructor. Not offered 1981–82.

T 12:20–2:15. S. Stein.

In-depth consideration of neighborhoods, central business districts, shorelines and waterfronts, new towns, planned-unit developments, high-density housing, highway-oriented uses, and others.]

554 Introduction to Planning Design Fall.

3 credits. Intended for graduate planning students without design backgrounds. Prerequisite for other students: permission of instructor.

T R 11:15–1:10. S. Stein.

Planning and design of built environments as an aesthetic reflection of comparative values and needs.

Lectures, seminars, readings, and design exercises explore basic concepts and issues related to urban planning, urban design, and site planning.

555 Planning Design Workshop Spring. Variable credit. Prerequisite: CRP 554 or permission of instructor. No previous graphics or design experience required.

T R 10:10–12:05. 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. Variable credit.

W 3–4:30; fieldwork, hours to be arranged.

S. Stein

Interdisciplinary teams of students from the environmental design disciplines and historic preservation program work in elementary and junior high school classrooms with school children and teachers to deepen their understanding of the impact of the built environment on their lives, and encourage their participation in the shaping of their own environment. Work in local school classrooms is emphasized.

557 Small-Town Community Design Workshop Fall and spring. 4 credits.

S. Stein and staff.

An in-depth approach to the problems and challenges facing the small-town commercial district. Various aspects of design including building and storefront rehabilitation, graphics and signage, construction details, and presentation are explored in workshop and studio settings. Emphasis is placed on preservation of historic architecture. Students participate in downtown revitalization activities, including contact with merchants and property owners, promotional events, and community events.

651 Urban Land Policy and Programs Fall. 3 credits. Prerequisite: 653 or permission of instructor.

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.

M 3:35–5:30. J. W. Reps.

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 Critical Areas Protection Fall. 3 credits.

M W F 9:05–9:55. R. Booth.

State governments attempt to protect critical areas such as tidal wetlands, key agricultural lands, and flood plains with planning and regulatory techniques. Significant management, implementation, and legal issues of these attempts are analyzed.

657 Planning and Development Workshop Fall or spring. 4 credits.

Staff.

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

460 (also Architecture 343) Introduction to the History of Urban Planning Fall. 3 credits.

T R 9:05–9:55; lab, W 2:30–3:20. Staff.

Survey of urban planning in Western civilization, from the Greeks and Romans through medieval, Renaissance, and modern Europe, to colonial and nineteenth-century America.

461 (also Architecture 542) Methods of Archival Research Spring. 3 credits.

T 10:10–12:05. 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 urban development.

462 The American Planning Tradition 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 (also Architecture 546) Documentation for Preservation Fall or spring. 3 credits.

M 2:30–5:30. M. A. Tomlan and visiting lecturers.

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 Fall and spring. 4 credits.

R 3:30–5:30. 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 (also Architecture 545) Perspectives on Preservation Fall. 3 credits.

T 12:20–3:20. M. A. Tomlan and visiting lecturers.

Introductory course for preservationists. A survey of the historical development of preservation activity in Europe and America leading to a contemporary comparative overview. Field trips to notable sites and districts.

[563 (also Architecture 544) Problems in Contemporary Preservation Practice Fall or spring. Variable credit. Not offered 1981–82.

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.]

564 (also Architecture 645) Building Materials Conservation Fall or spring. 3 credits. Open to juniors, seniors, and graduate students.

M. A. Tomlan and visiting lecturers.

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.

660 Seminar in the History of American City Planning Spring. 3 credits. Prerequisites: 462 or permission of the 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.

M 10:10–12:05. I. R. Stewart.

Seminar in the historical evolution of the American city. Emphasis on factors in urban growth, the process of urbanization, urban reform movement, and intellectual and social responses to the city.

663 Historic Preservation Law Spring. 3 credits. Offered alternate years.

M W 11:15–12:05. R. Booth.

Law of historic district and landmark designation; tools for preservation (such as police power, taxation, eminent domain); recent developments in state and federal historic preservation mandates.

664 Economics and Financing of Neighborhood Conservation and Preservation Fall. 2 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 Fall. 3 credits.

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

[570 Seminar in Latin American Urban Planning and Development] Fall and spring. 2 credits. Not offered 1981-82.

S. Stein and guest lecturers.
Seminar covering the broad urban planning and development problems facing Latin American cities. Historical development; current and future physical, social, economic, and administrative issues focusing on urban areas, with consideration of their regional context. Coordinated with CRP 571.]

[571 Workshop in Latin American Urban Planning and Development] Fall and spring. 4 credits. Not offered 1981-82.

S. Stein.
Application of planning theories and methodologies to problems of Latin American cities. Selection of specific urban planning projects for survey, analysis, policy formulation, plan preparation, and program development. Students work in teams or individually in workshop-studio setting.]

[670 Regional Planning and Development in Developing Nations] Fall. 4 credits. Prerequisite: second-year graduate standing. Not offered 1981-82.

T 2:30-5. W. W. Goldsmith.
Extensive case studies of development planning are analyzed. Focus is on a Marxist critique of the process of regional development through urbanization and in particular in the concepts of equity and efficiency, external economies, export linkages, and internal self-sufficiency and integration. Resource development, national integration, human development, and migration problems are discussed.]

671 Seminar in International Planning Spring. 1 credit. S-U grades only.
F 12:20-1:30. W. W. Goldsmith.

The international planning lecture series sponsors lectures by visiting scholars or professionals in the field of international development and planning. The only formal requirement for the course is a brief evaluation of the series at the end of the semester.

771 Seminar in Science and Technology Policy in Developing Nations Spring. 3 credits.
D. Lewis.

An examination of the issues facing developing countries as they endeavor to use technology in pursuit of their national goals. Topics covered include alternative choices of technology and the associated impacts, the role of multinational corporations, government policymaking 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 1981-82.
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.
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.

777 Theories of Development and Underdevelopment Spring. 4 credits. Prerequisite: familiarity with Marxist theory.
R 2:30-4:25. W. W. Goldsmith.

An exploration of current debates regarding the problem of articulation of the world economy and peripheral regions.

778 Fieldwork or Workshop in Planning for Developing Regions Fall or spring. Credit as assigned.
Staff.

Work on applied problems in planning for developing regions in a field or laboratory setting or both.

779 Special Topics in Planning for Developing Regions Fall or spring. Credit as assigned.
Staff.

878 Advanced Fieldwork or Workshop in Planning for Developing Regions Fall or spring. Credit as assigned.
Staff.

Work on applied problems in planning for developing regions in a field or laboratory setting or both.

879 Informal Studies in Planning for Developing Regions Fall or spring. Credit as assigned.
Staff.

Special Interprogram Topics: Environmental Health, Housing, and Institutional Planning

480 Environmental Issues and Public Decisions Fall. 3 credits.
M W F 11:15. R. Booth.

An examination of public decisions affecting environmental quality, including the pressures that require decisions on environmental issues; the methods of influencing those decisions; the decision makers; the criteria and rationale for the decisions; and the environmental, social, political, and economic impacts.

481 Environmental Aesthetics Spring. 4 credits.
K. C. Parsons.

Introduction to issues affecting the design of the large-scale built environment. Development of awareness to aspects of the urban environment; theories and concepts drawn from historical and current writings; critical analysis of extant urban spaces; understanding of the creative contributions of the design disciplines (i.e., urban designers, architects, landscape architects) to the evolving urban form. Primarily for students without background in design. Lectures, seminars, field projects.

582 Administrative Planning Spring. 3 credits. Prerequisite: permission of instructor.
K. C. Parsons.

An analysis of interactive elements in the planning process for colleges and universities. Topics include organizational and administrative theory, management objectives, evaluation, accountability-quantity and quality budgeting, and program planning. Governmental constraints are stressed.

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 1981-82.
M W F 11:15-12:05. R. Booth.

Examination of selected environmental law topics from a policy management standpoint. Topics include environmental impact statement preparation and analysis, pollution control laws, and government regulatory procedures.]

687 Environmental Management Workshop Spring. 3 credits.
M W F 9:05. R. Booth.

Research and analysis of environmental management topics of current interest at the state or local government level. Fieldwork is emphasized; students produce reports, recommendations, or draft legislation that contributes to solving current issues.

688 (also Engineering CEE B616) Environmental Law II: Natural Resources and Toxic Substances Spring. 3 credits. Prerequisite: one course in environmental law or permission of the instructors

Sem, hours to be arranged. R. Booth and N. Orloff.
Environmental Law I (CEE B615) 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 1981-82.
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 1981–82.

T R 9:05–9:55. Staff and guest lecturers.

Issues, institutions, politics, economics, and social elements involved in the planning and administration of health problems. Special emphasis is on planning techniques and methodologies.]

788 Fieldwork or Workshop in City and Regional Planning Fall or spring. Credit as assigned.

Staff.

Work on applied planning problems in a field or laboratory setting or both.

789 Special Topics in City and Regional Planning Fall or spring. Credit as assigned.

W 4:30–5:30. Staff.

790 Professional Planning Colloquium I Fall. 1 credit.

Staff.

791 Professional Planning Colloquium II Spring. 1 credit.

W 4:30–5:30. Staff.

792 Master's Thesis, Project, or Research Paper I Fall. Credit as assigned.

Staff.

793 Master's Thesis, Project, or Research Paper II Spring. Credit as assigned.

Staff.

794 Planning Internships Fall, spring, 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 includes development of research, analysis, and other technical skills. Weekly seminars draw on student field experiences, assigned readings, and guest speakers to examine current issues of federal, urban, and regional policy from the perspective of planning practice.

795 Master's Thesis in Preservation Planning Fall. Credit as assigned.

Staff.

796 Master's Thesis in Preservation Planning Spring. Credit as assigned.

Staff.

888 Informal Studies in Environmental Health Planning Fall or spring. Credit as assigned.

Staff.

889 Informal Studies in City and Regional Planning Fall or spring. Credit as assigned.

Staff.

890 Planning Research Seminar I Fall. 1 credit.

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. 1 credit.

Staff.

892 Doctoral Dissertation I Fall. Credit as assigned.

Staff.

893 Doctoral Dissertation II Spring. Credit as assigned.

Staff.

Landscape Architecture

L. Mirin

Associated Faculty: M. Adleman, E. Carter, T. Johnson, A. Lieberman, P. Trowbridge

The Landscape Architecture Program at Cornell is 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 offers three professional degree alternatives: a two-year graduate program leading to a Master of Landscape Architecture degree, a three-year graduate program leading to a Master of Landscape Architecture degree, and a four-year undergraduate program leading to a Bachelor of Science degree (from the College of Agriculture and Life Sciences).

For further information contact Professor Mirin, B40 East Sibley Hall.

***201 Design I: Basic Landscape Architectural Design** Fall. 5 credits.

T. H. Johnson.

***202 Design II: Basic Landscape Architectural Design** Spring. 5 credits.

M. I. Adleman.

***220 Principles of Landscape Architecture** Fall. 2 credits.

P. J. Trowbridge.

***221 Principles of Landscape Architecture Seminar** Fall. 1 credit.

P. J. Trowbridge.

***224 Plants and Design** Fall (1981 only) or spring. 3 credits.

M. I. Adleman.

***240 Landscape Design** Fall. 3 credits.

***301 Design III: Intermediate Landscape Architectural Design** Fall. 5 credits.

P. J. Trowbridge.

***302 Design IV: Intermediate Landscape Architectural Design** Spring. 5 credits.

T. H. Johnson.

***310 Site Construction I** Spring. 4 credits.

P. J. Trowbridge.

***311 Site Construction II** Fall. 4 credits.

T. H. Johnson.

***400 Thesis Project Seminar** Fall. 1 credit.

P. J. Trowbridge.

***401 Design V: Advanced Landscape Architectural Design** Fall. 5 credits.

M. I. Adleman.

***402 Design VI: Senior Thesis Project** Spring. 5 credits.

P. J. Trowbridge.

***431 Introduction to Parks and Recreation** Fall. 2 credits.

E. J. Carter.

***432 Parks and Recreation Workshop** Spring. 2 credits.

E. J. Carter.

***435 Urban Environmental Planning** Fall. 2 credits.

E. J. Carter.

***436 Urban Environment Workshop** Spring. 2 credits.

E. J. Carter.

497 (555) Independent Study in Landscape Architecture Fall or spring. 1–5 credits; may be repeated for credit. S-U grades optional.

L. Mirin.

Work on special topics by individuals or small groups.

***500 (502) Graduate Landscape Architecture Design Studio** Spring. 5 credits

501 Graduate Landscape Architecture Design Studio Fall. 5 credits.

Studios, M W F 1:25–4:25. L. Mirin.

Project design of complex landscape architecture problems. Emphasis on procedures and solutions responsive to historical example, natural and cultural system sensitivity, and client need. Studio work is coordinated with actual clients and involves existing sites.

520 Contemporary Issues in Landscape Architecture Fall. 2 credits.

Lec, F 11:15–1:25. L. Mirin.

Presentations on topics of currency and significance to the environmental design and planning fields. Issues are discussed from a landscape architecture point of view by practitioners and researchers representing a range of professions.

521 History of Landscape Architecture I Fall. 3 credits.

Lecs, T R 11:15–12:05; discs to be arranged.

L. Mirin.

A survey, from classical times to the present, emphasizing design principles and techniques that have established the landscape architecture tradition in Europe. Particular reference is made to the manner in which environments such as gardens, streets, plazas, parks, and new towns reflect in their built form a range of response to demands of culture, economics, technology, security, the law, and ecology.

522 History of Landscape Architecture II Spring. 3 credits.

Lecs, T R 11:15–12:05; discs to be arranged.

L. Mirin.

Landscape architecture in the United States from Jefferson to the present is examined as a unique expression of the American experience. Influences exerted by the physical landscape, the frontier and utopian spirit, and the cultural assumptions of democracy and capitalism are traced as they affect the forms of urban parks, private and corporate estates, public housing, transportation planning, national parks, and other open-space designs.

530 Urban Landscape Planning and Design Spring. 3 credits.

Lec, disc, and field trips to be arranged. L. Mirin.

The principles and techniques of landscape architectural development and conservation of urban open space. Areas studied include the urban landscape tradition, urban arboriculture, streets and strollways, design controls and public space, recreation, and housing.

***531 Regional Landscape Inventories and Information Systems** Fall. 3 credits.

A. S. Lieberman.

*Offered through the College of Agriculture and Life Sciences.

***532 Analysis and Use of Vegetation in Comprehensive Land Planning** Spring, 3 credits.
A. S. Lieberman.

621 Summer Internship Seminar Fall, 2 credits.
Hours to be arranged. L. Mirin.
Presentation and discussion of projects developed during summer internships.

***622 Graduate Seminar in Landscape Architecture** Spring, 2 credits.
T. H. Johnson.

650 Fieldwork or Workshop in Landscape Architecture Fall or spring, 1-5 credits; may be repeated for credit. S-U grades optional.
L. Mirin.
Work on applied problems in landscape architecture in a field or studio setting or both.

800 Thesis Research and Preparation in Landscape Architecture Fall or spring, 9 credits.
Hours to be arranged.
Independent research under faculty guidance leading to the development of a comprehensive and defensible design or study related to the field of landscape architecture.

*Offered through the College of Agriculture and Life Sciences.

Faculty Roster

Blum, Zevi, B. Arch., Cornell U. Assoc. Prof., Art
Booth, Richard S., J.D., George Washington U. Asst. Prof., City and Regional Planning
Bowman, Stanley J., M.F.A., U. of New Mexico. Asst. Prof., Art
Bragstad, Jeremiah O., B.Arch., U. of California at Berkeley. Asst. Prof., Architecture
Brandford, Paul, Ph.D., Harvard U. Asst. Prof., City and Regional Planning
Clavel, Pierre, Ph.D., Cornell U. Assoc. Prof., City and Regional Planning
Cohen, Peter, M.Arch., Harvard U. Adjunct Assoc. Prof., Architecture
Colby, Victor E., M.F.A., Cornell U. Prof., Art
Crump, Ralph W., B.Arch., Cornell U. Prof., Architecture
Cummer, W. Willson, Ph.D., U. of Pennsylvania. Asst. Prof., Architecture
Czamanski, Stan, Ph.D., U. of Pennsylvania. Prof., City and Regional Planning
Daly, Norman, M.A., Ohio State U. Prof. Emeritus, Art
Dennis, Michael D., B.Arch., U. of Oregon. Assoc. Prof., Architecture
Evelt, Kenneth W., M.A., Colorado Coll. Prof. Emeritus, Art
Forester, John, Ph.D., U. of California at Berkeley. Asst. Prof., City and Regional Planning
Goehner, Werner H., M.Arch., Cornell U. Asst. Prof., Architecture
Goldsmith, William W., Ph.D., Cornell U. Assoc. Prof., City and Regional Planning
Greenberg, Donald P., Ph.D., Cornell U. Prof., Architecture
Hascup, George E., B.Arch., U. of California at Berkeley. Assoc. Prof., Architecture
Hodgden, Lee F., M.Arch., Massachusetts Inst. of Technology. Adjunct Assoc. Prof.
Jones, Barclay G., Ph.D., U. of North Carolina. Prof., City and Regional Planning
Kelly, Burnham, M.C.P., Massachusetts Inst. of Technology. Prof. Emeritus, City and Regional Planning
Kira, Alexander, M.R.P., Cornell U. Prof., Architecture
Lewis, David B., Ph.D., Cornell U. Asst. 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. Assoc. Prof., Architecture

Mackenzie, Archie B., M.Arch., U. of California at Berkeley. Assoc. Prof., Architecture
Meyer, Elizabeth H., M.F.A., U. of Texas. Asst. Prof., Art
Mikus, Eleanore, M.A., U. of Denver. Asst. Prof., Art
Miller, John C., M.Arch., Cornell U. Asst. Prof., Architecture
Mirin, Leonard J., M.L.A., U. of Michigan. Assoc. Prof., Landscape Architecture
Morris, Ellen K., Ph.D., Princeton U. Asst. Prof., Architecture
Nelkin, Dorothy W., B.A., Cornell U. Prof., City and Regional Planning/STS†/Physics
Otto, Christian F., Ph.D., Columbia U. Assoc. 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. Assoc. Prof., Art
Reps, John W., M.R.P., Cornell U. Prof., City and Regional Planning
Richardson, Henry W., M.R.P., Cornell U. Assoc. Prof., Architecture
Romanach, Maria, M.Arch., Princeton U. Asst. Prof., Architecture
Rowe, Colin F., M.A., U. of London. Prof., Architecture
Saltzman, Sid, Ph.D., Cornell U. Prof., City and Regional Planning
Saul, Francis W., M.S., Harvard U. Assoc. Prof., Architecture
Schack, Mario L., M.Arch., Harvard U. Prof., Architecture
Schiler, Marc, M.S., Cornell U. Asst. Prof., Architecture
Seley, Jason, B.A., Cornell U. Prof., Art
Senkevitch, Anatole, Ph.D., Cornell U. Assoc. Prof., Architecture
Shaw, John P., M.Arch., Massachusetts Inst. of Technology. Prof., Architecture
Simons, David M., M.F.A., Princeton U. Assoc. 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. Asst. Prof., City and Regional Planning
Ungers, O. Mathias, Diploma, Technical U. Karlsruhe. Prof., Architecture
Valerio, James, M.F.A., Art Inst. of Chicago. Assoc. Prof., Art
Webb, Patrick M., M.F.A., Yale U. Asst. Prof., Art
Wells, Jerry A., B.Arch., U. of Texas. Nathaniel and Margaret Owings Distinguished Alumni Prof. of Architecture, Architecture

†Program on Science, Technology, and Society.

College of Arts and Sciences

Administration

Alain Seznec, dean
 Lynne S. Abel, associate dean
 Geoffrey V. Chester, associate dean
 Urbain J. DeWinter, associate dean and director of admissions
 Jack W. Lowe, director of finance and administration
 Lloyd Carter-Leavitt, director of development
 Carol O'B. Cooke, deputy director of admissions

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 159 Goldwin Smith Hall for further information.	Sept. 9	Feb. 3
Last day for adding courses without petition.	Sept. 23	Feb. 12
Last day for dropping courses without \$10 fee.	Sept. 23	Feb. 12
Last day to petition to accelerate to graduate at the end of the current term.	Sept. 23	Feb. 12
Last day for changing grade option (S-U).	Sept. 23	Feb. 12
Deadline for submitting independent major requests (second meeting).	Oct. 19	March 15
Last day for requesting leave of absence or withdrawal for the current term.	Oct. 28	March 19
Last day for dropping courses without petition.	Oct. 28	March 19
Deadline for requesting permission to study in absentia the following term.	Nov. 1	April 1
Advance course enrollment for the following term	Nov. 2-13	April 12-23
Deadline for applying to the College Scholar Program.		May 4
Deadline for requesting internal transfer to the College of Arts and Sciences for the following term.		July 1

Program of Study

The College of Arts and Sciences at Cornell is a traditional liberal arts college. It is composed of those departments that teach and study the humanities, the basic sciences, the social sciences, and the expressive arts. It is also a college within a university, and this wider community provides strength and diversity not available in an isolated undergraduate institution. Students may draw upon the knowledge and facilities of the professional colleges to

supplement their studies. Finally, the college is a graduate school and research center attracting faculty whose active involvement in writing and research requires first-rate academic facilities, and whose energetic participation in undergraduate teaching brings to their students the most current ideas in modern scholarship. It is this combination of functions that gives the college its distinctive character.

The variety and richness of the curriculum is extraordinary; there is no course that all students must take and there are several hundred from which they may choose. Yet the faculty believe that there should be a recognizable pattern to each student's education.

That pattern includes familiarity with several different modes of thought that are reflected in the natural sciences, the social sciences, and in those achievements of intellect and imagination that are the focus of the humanities and the expressive arts.

In addition to these general areas of knowledge, students study foreign languages, acquire effective writing skills, and concentrate on one particular field to develop, as fully as possible, the powers of imaginative and critical thinking. To accomplish these objectives, the college has certain requirements for graduation.

Summary of Basic College Requirements for Graduation

- 1) Minimum number of courses:** 34 courses
- 2) Freshman Seminar:** Two courses (6 credits).
- 3) Foreign language:** Qualification in two languages, or proficiency in one (0 to 5 courses, depending on placement).
- 4) Distribution:** An approved sequence of courses (6 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
 - b. A course sequence in one of the subdivisions above that has not been previously used to complete a requirement (see p. 87).
- 5) Major**
- 6) Electives:** 4 or 5 courses (or 15 credits) in courses not used to fulfill other requirements.
- 7) Credits:** A total of 120 credits, of which 100 must be taken in the College of Arts and Sciences.
- 8) Residence:** Eight full-time terms, unless a student can successfully complete the other requirements in fewer than eight terms and is allowed to accelerate graduation.
- 9) Physical education:** Completion of the University requirement (see p. 17).

Ordinarily, a student may not use the same course to fulfill more than one college requirement (see page 87).

Minimum Requirement for Courses and Credit

Students who are first admitted to the College of Arts and Sciences in the fall of 1980 or thereafter must complete at least 34 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 a half course toward the thirty-four. When single-credit courses form a part of a series (certain offerings in mathematics, biology, and music, for instance) they can be aggregated to count as one-half course. Students must also complete 120 credits, 100 of which must be from courses taken in the College of Arts and Sciences, to earn the Bachelor of Arts degree. Credits earned from advanced placement examinations, courses approved for study in absentia, and courses taken in

other divisions or institutions that are certified by the major adviser as part of a student's major may be counted towards the 100 credits required within the college.

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 languages and/or literature or both: in the College of Arts and Sciences: Africana Studies and Research Center, Asian Studies, Classics, German Literature, Modern Language and Linguistics, Near Eastern Studies, Romance Studies, and Russian Literature.

There are two ways of satisfying the language requirement:

- 1) by attaining *proficiency* in one language or
- 2) by attaining *qualification* in two languages.

Proficiency

Proficiency is attained by passing a specified, one-semester, 200-level course (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 one 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 or 123 in languages taught by the Department of Modern Languages and Linguistics; NES 102 or 122 in Hebrew; NES 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 CPT (CEEB) examination (a score of 500 in Hebrew).
- 4) Placement in a 200-level course by special examination (in cases where no CPT (CEEB) examination is available).

A student may submit a 560 CPT (CEEB) score at the end of a course numbered 122, thus attaining *qualification* without taking 123. This procedure is optional; the student with a score of 560 or better may want to take 123 in order to be better prepared for the 200-level courses.

Speakers of languages other than English may get credit for their bilingual ability. Their English achievement is measured by the Test of English as a Foreign Language (TOEFL), a requirement for matriculation; their performance in one other language learned outside the academic environment is measured by examination, and evidence for abilities in reading and writing, as well as speaking, is required. A maximum of 6 advanced placement credits are granted to students who demonstrate *proficiency* equivalent to course work at the 200 level or above at Cornell.

Language Course Placement and Credit

Students who have had two or more years of high school study in a language cannot 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, Hebrew, Italian, Latin 105, Russian, and Spanish courses: CPT, the College Placement Test (CEEB). Entering students who have not taken the CPT (CEEB) in high school and who want to continue their language study have to take the CPT (CEEB) 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 must register with the Office of Guidance and Testing, 203 Barnes Hall, and pay a fee of \$4.
- 2) Latin (all courses except 105): departmental examination.
- 3) Other languages: special examinations; see professor in charge.
- 4) High achievement (students with a CPT (CEEB) 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, see the professor in charge.

French

CPT (CEEB) 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 (CEEB) Reading Score	Language Course	Literature Course
Below 450	121	
450-559	123	
560-649	203	201
650 and above	Apply for the Cornell Advanced Standing Examination (CASE)	

Italian

CPT (CEEB) Reading Score	Language Courses	Literature Courses
Below 450	121	
450-559	123	
560-649	203	201
650 and above	Apply for Cornell Advanced Standing Examination (CASE)	

Russian

CPT (CEEB) Reading Score	Language Courses	Literature Courses
Below 450	101 121	
450-559	102 123	
560-649	203	201
650 and above	Apply for Cornell Advanced Standing Examination (CASE)	

Spanish

CPT (CEEB) Reading Score	Language Courses	Literature Courses
Below 450	121	
450-559	123	
560-649	203	201, 212
650 and above	Apply for Cornell Advanced Standing Examination (CASE)	

Latin

CPT (CEEB)

Reading Score	Course Number
Below 450	105
450-559	Placement by Examination
560-649	Apply for the Cornell Advanced Standing Examination (CASE)
650 and above	

Hebrew

CPT (CEEB)

Reading Score	Course Number
Below 425	101, 121
425-499	102, 122
500-649	201, 202, 221, 222
650 and above	Apply for the Cornell Advanced Standing Examination (CASE)

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) CEEB Advanced Placement Examination
French and Spanish: A score of 4 or 5 yields 3 credits on the French or Spanish language examinations and literature examinations.
German: A score of 5 yields 3 credits on the German literature examination: students who achieve a score of 4 will be awarded 3 credits if they earn a grade of B+ or higher in a course in German literature.
Hebrew: A score of 650 on the CPT in Hebrew yields 3 credits in Hebrew. Additional credit may be earned by outstanding performance on examination (b) below.
Latin and Greek: Students should consult the Department of Classics, 120A Goldwin Smith Hall. Advanced standing 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 6 advanced standing credits.
Greek: For information concerning advanced placement consult the chairperson of the Department of classics.
- b) Cornell Advanced Standing Examination (CASE)
To be eligible for this examination the student must have achieved a score of 650 on the CPT (CEEB) examination. For details on registration, see Course Placement, above. The maximum amount of credit is 6 hours.
- c) Special examinations are given for languages where no CPT (CEEB) 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 either 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 in either the physical sciences, history, or the humanities.

Courses fulfilling the distribution requirement must be taken in the College of Arts and Sciences; however, some students have successfully petitioned to take studio art courses in the Department of Art 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, one course from Astronomy 101, 102, 111, or 112 plus one of the following: Astronomy 215, Physics 202 or Physics 203. 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 or 103, 105, 102.
Physics: Any two sequential courses such as 101-102 or 207-208; or any two general-education courses from the group 201-205.

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 biological sciences.

Group 2: Social Sciences or History

a. Social Sciences

Africana studies: Any two of 171, 172, 190, 231, 290, 301, 203, 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 listed under archaeology. Courses cross-referenced but not taught by members of the department do not satisfy the distribution requirement.
Archaeology: Archaeology 100 and any one of the following: Anthropology 116, 150, 250, 333, 352, 354, 355, 358, 435, 456, 494, 633, 664, 666, 667.
Economics: 101-102.
Government: Any two of 111, 131, 161, and 181; or any one of these courses followed by a 300-level course in the same area.
Linguistics: 101-102 or 111-112, or a combination of Linguistics 101 and any course for which 101 is a prerequisite.
Psychology: Any two courses in psychology with the exception of Psychology 123, 322, 324, 326, 350, 361, 396, 422, 425, 471, 472, 473, 476, and 491.
Sociology: Any two courses in sociology. Students without background are advised to choose courses at the 100 or 200 level.
Women's studies: Any two of 238, 244, 277, 321, 353, 422, 671, 685, plus previously taken courses, with the department's approval.

b. History

Africana studies: Any two of 203, 204, 231, 283, 344, 360, 361, 370, 381, 405, 460, 475, 483, 490.
History: Any two courses in the Department of History.

Near Eastern studies: NES 151–152 or any two NES history courses at the 200 or 300 level that form a reasonable sequence or combination.
Women's studies: Any two of 238, 326, 363, 426, 626, 627, plus previously taken courses, with the department's approval.

Group 3: Humanities or Expressive Arts**a. Humanities**

Africana studies: Any two of 219, 422, 431, 432, 465, 492.

Archaeology: Archaeology 100 and any of the following: Archaeology 275, 281, 310, 311, 313; Classics 200, 206, 220, 221, 232, 233, 309, 320, 321, 329, 629, 630; Near Eastern studies 243, 261, 263, 363, 366, 367, 469.

Asian studies: Any two courses numbered 200 or above that form a reasonable sequence.

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, 109, 117, 118, 119, 120, 121, 122, 150, 200, 206, 211, 212, 220, 221, 222, 224, 225, 226, 232, 233, 236, 237, 238, 270, 300, 304, 309, 319, 320, 321, 322, 323, 326, 331, 332, 333, 336, 337, 339, 340, 345, 358, 360, 363, 365, 366, 368, 426, 428, 430, 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, other than those required for teacher certification (English 496 and courses in the 500s). If students have used English courses to satisfy the expressive arts requirement, then the student 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: NES 151–152 or any two NES civilization or literature courses at the 200 or 300 level that form a reasonable sequence or combination.

Philosophy: Any two courses with the following exceptions: (1) Philosophy 100, if used to satisfy the Freshman Seminar requirement; (2) a combination of two courses in logic, such as 131, 231, 331, 431, 432, and 436.

Russian literature: Any two courses at the 200 level or above.

Spanish literature: Two of 201, 315, 316, 317, or any other 300 level literature courses.

Women's studies: Any two of 248, 249, 399, 451, 478, 479, 483, plus previously taken courses, with the department's approval.

b. Expressive Arts

Africana studies: Any two of 137, 138, 285, 303, 465.

Archaeology: Archaeology 100 and any one of the following: History of Art 220, 221, 320, 321, 322, 323, 325, 327, or 330.

English: Any two of the courses at the 200 level or above that are numbered in the 80s (e.g., 281, 382).

History of art: Any two courses at the 200 level or above, or Archaeology 100 and one of the History of Art courses listed under Archaeology.

Music: 6 credits in music, except 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.

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 100, 105, 107, 403. Computer Science 100, 101, 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 or ALS 115 (College of Agriculture and Life Sciences) do not satisfy the requirement.

b. An unused subdivision

A sequence of courses in any one of the subdivisions in groups 1–3 that has not been used to fill that group's requirement.

The Major

In their last two years students devote roughly one-half their time acquiring depth and competence in a major subject. The choice of major is not intended to be a lifetime's occupation, although it may become that. By selecting one field of interest students can do advanced work and focus the full extent of their imaginative and intellectual capacities on something they care about.

Students must be accepted by departments as majors before registering for courses for the junior year. Most departments and programs specify certain prerequisites for admission to the major; see the departmental listings on the following pages. A department may refuse to accept or continue as a major any student whose performance does not meet departmental standards. Some majors require courses in related subjects outside the department or outside the college; required courses taken outside the college are considered to be part of the 100 credits required in the College of Arts and Sciences for graduation. Majors are offered by each of the departments except the Department of Astronomy. There are also majors in Africana studies, American studies, archaeology, biology and society, dance, German area studies, Russian and Soviet studies, and social relations. Some students wish to pursue an interest that cannot be met within an established major. They may plan, with the help of their faculty adviser, an independent major that includes courses from several departments.

Electives

Of the 34 courses or 120 credits required for graduation, about half are free electives. Students must complete 4 or 5 courses or 15 credits in courses that are offered outside the major and are not used to fill another requirement. Electives taken in other divisions of the University may be used to gain practical training or specialized knowledge.

Courses and College Requirements

A course may not be used to fulfill more than one college requirement with the following exceptions.

- 1) A course may be used to fulfill a distribution requirement and also a major requirement, provided that the major department agrees.
- 2) A one-semester course in foreign literature that is acceptable for achieving proficiency in that language may also be used as a partial fulfillment of the distribution requirement in the humanities.
- 3) Students whose native language is not English who take English 211–212 may fulfill both the Freshman Seminar requirement and the humanities or expressive art distribution requirement by taking two Freshman Seminars offered in English, history, history of art, classics, philosophy, romance studies, Russian literature, German literature, or comparative literature.

Courses used to fulfill college requirements may be taken for S-U grades.

Residence

Normally students spend eight full-time semesters in residence. However, students who have advanced placement credit or summer school credit or who have taken additional courses in order to accelerate, may graduate in six or seven terms if they satisfy all the requirements for graduation and have earned grades of C or better in at least 100 of the 120 credits. Students are normally expected to earn at least 90 credits during their terms of residence at Cornell.

Transfer students must spend four regular semesters or a minimum of three regular semesters and one six-week summer session in residence at Cornell, earning at least 60 credits during that time.

Ninth term. Students may spend a ninth term in residence by notifying the Office of Records and Scheduling, 142 Goldwin Smith Hall. Students receiving financial aid should discuss funding with an adviser in the Office of Financial Aid.

Physical Education

See University Requirements for Graduation. 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, Office of Special Programs, 159 Goldwin Smith Hall, for further information. Deadlines for submitting independent major proposals are Sept. 9, Oct. 19, Feb. 3, and Mar. 15 of the second semester of the student's sophomore year.

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 must 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 two 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 to accelerate, eight full terms in the College of Arts and Sciences. They must complete the physical education requirement. Beginning with the class of 1982 each College Scholar 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 Office of Special Programs, 159 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 must 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.

Dual Degree Program

Especially able students may earn both a Bachelor of Arts degree from the College of Arts and Sciences and either (1) a Bachelor of Science degree from the College of Engineering or (2) a Bachelor of Fine Arts from the Department of Art in the College of Architecture, Art, and Planning, or (3) a Bachelor of Science degree in Urban and Regional Studies from the Department of City and Regional Planning in the College of Architecture, Art, and Planning. The dual degree program ordinarily takes five years to complete. Students enter one of these colleges as freshmen and begin the dual degree program with the College of Arts and Sciences in the second or third year. For further information contact Assistant Dean Rosenberg, 134 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 the State University of New York 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 the Undergraduate Research Program; premed 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 the bulletin board opposite the Office of Special Programs, 159 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

Full-Year Asian Language Concentration

More than 40 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 Language 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. FALCON allows students who are interested in the Far East to study Chinese, Japanese, or Vietnamese exclusively for one year, gaining proficiency in the language and familiarity with the culture. Since 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 make 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 to plan a program in which you are interested and in which you will do well. Beyond that, students are advised to take courses that will develop the powers of precise, analytical thinking and proficiency in writing and speaking.

The college offers a concentration in law and society. Many prelaw students complete four courses in this program because it interests them, not because it helps them get into law school.

Students who are interested in law should consult Assistant Dean Watson, Academic Advising Center, 134 Goldwin Smith Hall.

Premedical Study

The breadth and depth afforded by a liberal arts education are invaluable for people who plan medical careers, whether they intend to practice or go into medical research. Such training has a profound effect upon the doctor's usefulness to patients, and it affords the flexibility of mind that is needed for major research undertakings. Medical and dental schools do not prescribe a particular major; they do, however, require particular undergraduate courses. Students who are interested in medical careers are urged to visit the college's Academic Advising Center and the Health Careers Program office at the Career Center for help in planning their undergraduate program.

Off-Campus Programs

Study In Absentia

Many students find it appropriate to their majors or to their overall academic programs to study abroad for one or two semesters or to study at an American institution that offers programs not available at Cornell. When it makes academic sense, the college encourages its students to study in absentia and grants credit toward the degree for work satisfactorily completed. Although Cornell does not sponsor any 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 consult Assistant Dean Beatrice Rosenberg in the Academic Advising Center, 134 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 each course must be approved by the appropriate department chairperson. Credits earned in absentia may count as part of the 100 credits required within the College of Arts and Sciences if the field of study is represented in the college but the particular courses or program are not. Normally transfer students will not be allowed to study in absentia.

When plans are final, the student should submit an outline of the course of study and the signatures of the faculty adviser and the appropriate chairpersons to Assistant Dean Rosenberg, 134 Goldwin Smith Hall. The University charges \$15 for each semester of study in absentia.

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 broad 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 Director 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. 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 through the program office, 105 McGraw Hall (256-6205).

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 contact Assistant Dean Unsworth, 134 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 Clausen, 142 Goldwin Smith Hall

New Students

The Academic Advising Center will inform incoming freshmen and transfer students about procedures for scheduling courses at a briefing during orientation week.

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. Before signing into courses students should make appointments with their faculty advisers to plan their programs. Student advisers will also assist students. Any student is welcome to discuss programs and plans with an assistant dean in the Academic Advising Center, 134 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. In the fall continuing students receive their course schedules at University registration. They also receive a copy of their Permanent Record Card, which shows the courses taken, grades received, graduation requirements fulfilled, and academic actions. Copies of Permanent Record Cards are not official transcripts.

Limits on Course Enrollment

Students must take an average of four or five courses (15 credits) each semester in order to graduate in eight terms. At a minimum students must carry three or four courses (12 credits); if for compelling personal or academic reasons students must 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 adviser approves. No more than 22 credits may be taken in a regular semester.

Special Registration Options

Signatures on Forms. Students must have petitions signed (to add or drop a course, study in absentia, et cetera) to ensure that real advising has taken place. Forgery on forms will be handled as an infringement of academic integrity.

Acceleration

Some students are able to earn the Bachelor of Arts degree in six or seven terms. In many cases these students have entered with substantial advanced placement credit. Students may also earn more than 15 credits a term. Acceleration plans must be approved by the student's major adviser, department chairperson, and the college. Students who accelerate must earn grades of C or better in 100 credits of course work. Ideally, acceleration plans should be worked out at the time students choose majors at the end of the sophomore year. Acceleration petitions may be obtained in the Records and Scheduling Office, 142 Goldwin Smith Hall.

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 only under unusual circumstances. The student must fill out a petition, have it approved by his or her adviser and the course instructor and pay a \$10 fee. After the eighth week courses may be changed only if there are extraordinary and unforeseen circumstances. Students must obtain the approval of the course instructor and their faculty adviser on the petition to drop the course and submit the petition for consideration by the Committee on Academic Records.

Leaves of Absence

Many students have found it useful to take time off from college to think about their goals and progress, or just to take a break from studying. Students in good standing who take a leave by the end of the seventh week of the semester are welcome to register in the college the following semester. Five years is the maximum length of time a student may be on leave and return without special permission. Leaves of absence are of four types.

- 1) *Personal leaves* have no conditions concerning the right to reenter the college except for the five-year limit. Readmission is automatic if a written request is made one month before the beginning of the term in which the student wishes to return.
- 2) *Medical leaves* are granted by the college only upon recommendation by a physician from Gannett Clinic. 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 Clinic 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.
- 4) *Required leaves:* The Committee on Academic Records may require a leave of absence if a student is in academic difficulty. See Academic Actions, p. 90.

Any student who wishes to take a leave of absence should consult a member of the Academic Advising Center staff. If a student takes a leave before the end of the term, no courses taken that term will be shown on the student's record. Upon readmission, the student's graduation date will be recalculated according to the numbers of terms completed, the number of acceptable credits earned toward the degree, and the requirements for graduation. *If a student takes courses elsewhere while on leave the earned credits may be accepted as part of the 20 out-of-college credits of the 120 credits needed for graduation.*

Withdrawals

A withdrawal is a voluntary severance of connection with the University. If a student wishes to withdraw after registering for the term, the withdrawal must be requested before the beginning of the eighth week of classes. 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 Committee on Academic Records. *If a student fails to register for a term and does not request a leave, the student will be withdrawn from the college for failure to register.*

Transferring within Cornell (Internal Transfer)

Internal transfer is attractive for many students whose intellectual interests change. Students who wish to transfer from one college or school at Cornell to another should discuss their eligibility with an admissions 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 to be considered for admission to the college. 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 a minimum average of 2.7 and without any grades of incomplete, any S-U grades (unless only S-U grades are offered for that particular course), or any grades below C. Satisfying this minimum requirement does not, however, guarantee admission. Admission to the college is based upon consideration of the student's entire record at Cornell and the high school record, not just the work of one term. Interested students should see Assistant Dean Rosenberg, 134 Goldwin Smith Hall.

Part-Time Study and Pro Rata Tuition

The college ordinarily expects its students to be full-time students. Except in the case of Ithaca residents who are twenty-three years of age or older, part-time attendance is permitted only in unusual circumstances. In certain circumstances seniors who are completing their final term in the college may be allowed to register for fewer than 12 credits and pay pro rata tuition. The guidelines for granting this permission are adhered to strictly.

Guidelines for part-time study:

- 1) A student who has completed all degree requirements by the end of the seventh term may receive permission to study part time during the eighth term.
- 2) A student who has completed all degree requirements in seven terms but is majoring in a department that requires candidates for honors to complete the thesis in the eighth term may be permitted to register for fewer than 12 credits.

- 3) A student who has received permission to accelerate 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 pay one-fifteenth of the semester's tuition and fees for each credit.

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. No more than 60 transfer credits or sixteen courses, including no more than 20 credits in courses not commonly given by the College of Arts and Sciences, may be applied toward the degree. Transfer students must successfully complete at least sixteen courses or 60 credits at Cornell.

Advanced placement credit See page 10.

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. Upperclass 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, 144 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, unless the student's major adviser certifies that it contributes to the major. Transcripts should be sent to the Office of Records and Scheduling, 144 Goldwin Smith Hall.

Entering students who wish to receive credit toward the degree for courses completed in a summer session at Cornell or elsewhere should have transcripts sent to the Office of Records and Scheduling, 144 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 consult the Office of Special Programs, 159 Goldwin Smith Hall.

Noncredit courses The college does not grant credit for all courses offered by the University. Courses in remedial reading, writing, and

mathematics; physical education; shorthand; typing; and most military training courses are among those for which credit is not given.

Auditing There is no formal arrangement for auditing courses by undergraduates. Those who wish to sit in on a class ask permission of the course instructor.

Repeating courses Students may repeat courses. If the instructor certifies that the course content has been changed, credit may be granted a second time. If the content has not been changed the course may be repeated to obtain a better grade, but the original grade remains on the transcript and the course is repeated for 0 credit.

Students who plan to repeat a course should notify the Records and Scheduling Office, 144 Goldwin Smith Hall.

Academic Standing

Students are in good standing for the term if they successfully complete at least 12 credits by the end of the term and receive no more than one D and no F or U grades.

Honors

Dean's List

Students must earn letter grades for at least 12 credits to qualify for Dean's List. The requirements vary according to the number of credits a student has taken during the term. Students who take only 12 credits must earn all As. Students who take 13 or 14 credits must earn As in at least 10 credits and Bs in the rest. Students who take 15 or more credits in the term must earn As in at least 8 credits and usually As or Bs in the rest. Students who have grades of C or C+ must have an equal number of As beyond the minimum of 8 to balance the Cs.

Students who have received a grade of U (not including a U in physical education), or a grade of C- or lower, are not qualified for the Dean's List.

Grades excluded from the computations A grade of S does not enter into the calculation, and a course graded S may not count as part of the credits for which letter grades are required. Grades of Incomplete do not count toward qualification for the Dean's List. Students who qualify for the Dean's List, excluding the Incomplete, will be added to the list when the Incomplete is made up, provided the grade is better than a C-.

Courses taken in military science, naval science, or aerospace studies, typing, supplemental courses, Math 109, or courses taken for zero credit or any other courses for which students of the College of Arts and Sciences may not earn credit are disregarded in the calculation of the Dean's List.

Bachelor of Arts with Honors

Almost all departments offer honors programs for students who have demonstrated exceptional ability in the discipline and who seek an opportunity to explore branches of their subject not represented in the regular curriculum or to gain experience in original investigation. The honors programs are described by individual departments in the following sections. The degree of Bachelor of Arts with Honors will be conferred upon students who, in addition to having completed the requirements for the degree of Bachelor of Arts, have satisfactorily completed the honors program in their major and have been recommended for the degree by their major department, the Independent Major Program, or the College Scholar Program.

Bachelor of Arts with Distinction

The degree of Bachelor of Arts with Distinction in All Subjects will be conferred upon students who, in addition to having completed the requirements for the degree of Bachelor of Arts, have:

- 1) completed at least sixty credits while registered in regular sessions in the College of Arts and Sciences;
- 2) received a grade of B- or better in at least three-fourths of the total number of credits taken while registered in the college;
- 3) received grades of A- or better for at least one-half of the total number of credits taken while registered in the college;
- 4) received a grade below C- in no more than one course;
- 5) received no failing grade;
- 6) maintained good standing in each of their last four terms; and
- 7) have no Incompletes remaining on their records.

Failure to Maintain Good Standing

Students are not in good standing if they complete fewer than 12 credits; if they have more than one D or any F or U grades; if they have not made satisfactory overall progress in grades or credits (whether due to failures or incompletes) or in the requirements of the college or the major. Such students may be considered for academic action by the Committee on Academic Records, the Committee of Deans, or one of the deans of the college.

Academic Actions

Warning Any student who fails to maintain good standing may be warned. The warning may be given informally by a committee of assistant deans in the college or it may be given formally by the faculty's Committee on Academic Records. A warning is posted on a student's Permanent Record Card, but is not reported to the University Registrar and does not appear on official transcripts.

Final warning Students whose work is so seriously deficient that they risk being required to leave may be placed on Final Warning by the Committee on Academic Records. A final warning is posted on the student's Permanent Record Card, but is not reported to the University Registrar and does not appear on official transcripts.

Required leave of absence A student in serious academic difficulty may be required by the Committee on Academic Records to take a leave of absence, normally for a full year. In some cases the students will be required to furnish evidence that they are ready to return before being allowed to reregister in the college. Students who request to return in less than a year must present to the committee exceptionally strong evidence of their readiness to return. "Required Leave of Absence" is posted on the student's Permanent Record Card in the college; the University Registrar is notified and "Leave of Absence" and the date will appear on the student's transcript.

May not reregister The Committee on Academic Records may stipulate that a student may not reregister in the college on the basis of a highly unsatisfactory record for one term or for failure to make satisfactory overall progress in grades, credits, or the requirements of the major. This action expels the student permanently from the college. "May not Reregister" is posted on the student's Permanent Record Card; the University Registrar is notified and "May not reregister in the College of Arts and Sciences" and the date will appear on the official transcript.

Students being reviewed for academic action are urged to present evidence that will help explain their

poor academic performance. Students may appeal a decision or action of the committee if they have new evidence to present.

Grades

Letter Grades

See Grading Guidelines, p. 19.

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. 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-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 is 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, 144 Goldwin Smith Hall, fill the form out to indicate the grade option change, and have it signed by the course instructor and the faculty adviser. The form must be returned to the Records and Scheduling Office within the first three weeks of the term. *No change in the grading option can be made after the first three weeks of the term.*

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 alongside the incomplete, so the notation of the incomplete remains on the student's record permanently.

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.

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. A student adviser is also available each weekday, 9:00 a.m.-2:00 p.m., at the desk at the rear of the Temple of Zeus, the snack bar on the ground floor of Goldwin Smith Hall.

Major Advisers

After acceptance into a major program, students are assigned a major adviser with whom they make many of their most important decisions at Cornell. The adviser must approve the student's course of study and eventually certify the completion of the major. The major adviser should be consulted by the student about all academic plans, including such aspects as acceleration and graduate study. The adviser's support is especially important if a student petitions for an exception to the requirements for the degree.

Academic Advising Center

Glenn Altschuler, assistant dean, freshmen
Beatrice G. Rosenberg, assistant dean, sophomores
Margaret C. Unsworth, assistant dean, juniors
Lawrence Watson, assistant dean, seniors
Janice P. Turner, assistant dean for minority affairs

The Academic Advising Center, 134 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, fieldwork, et cetera, and they welcome all questions relating to the college.

Handicapped students. Cornell's academic and social resources are fully available to all students, including persons who have impairment of sight, hearing, mobility, or muscular coordination. The college's adviser for the handicapped is Assistant Dean, 134 Goldwin Smith Hall.

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 faculty of the College of Arts and Sciences has established a Board of General Education responsible for creating and maintaining a program of courses for nonspecialists. Such courses are free from the need to present the elements of an entire subject as a basis for more specialized study. They can therefore be deeper and more challenging than conventional introductions, as concerned with the general ability to write and think as they are with substantive content. Besides such courses for nonspecialists, the board also seeks courses that require a relatively advanced acquaintance with a particular field, but not in the interest of further specialization. The aim of such advanced general education courses is to raise, for an informed audience, questions about the history of a field, about its methodological or philosophical presuppositions, or about its relation to other fields of knowledge.

Twice a year at advance course enrollment the board distributes to students and faculty members in the college a set of descriptions of courses and departmental programs. These have been recommended by departments or faculty members and are considered by the board to be particularly suitable as introductory or advanced general education courses. Almost any course in the University can serve as a general education course for some student. The purpose of the board's booklet is to call attention to some of the new and existing courses or programs in the College of Arts and Sciences whose primary focus is on general education. The booklet is not intended to be used as a substitute for the full description of courses in planning electives, but rather as a guide to some of the more striking possibilities to be found in these pages.

Akkadian

See Department of Near Eastern Studies, p. 159.

American Studies

S. C. Strout, chairman and director of undergraduate studies, 110 Rockefeller Hall, 256-4611;
M. J. Colacurcio, R. L. Moore, R. Polenberg,
F. Somkin

The Major

The major in American studies is basically a program of coordinated study in the history and literature of the United States. It is not a "double major." The prerequisites are minimal: one course in British or American history at the 100 or 200 level and one course in British or American literature at the 200 level. The major itself is structured and demanding, and students who expect to become American studies majors should apply to the chairperson to arrange for a major adviser.

In consultation with their advisers, American studies majors elect 32 credits (or 8 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; 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 depends 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

R. J. Smith, chairman; R. Ascher, director of undergraduate studies, B63 McGraw Hall, 256-5137; J. A. Boon, V. R. Dyson-Hudson, C. J. Greenhouse, D. J. Greenwood, J. S. Henderson, C. F. Hockett, D. H. Holmberg, B. J. Isbell, L. C. Jackson, A. T. Kirsch, B. Lambert, T. F. Lynch, C. Morris, J. V. Murra, P. S. Sangren, J. T. Siegel

Anthropology grew out of curiosity about the ways past and present human societies have differed and have been similar. As a craft, anthropology has developed and borrowed many strategies to approach these differences and uniformities. Some are archaeological, concerned with cultures long gone or destroyed by the spread of empires. Others

are sociocultural, dealing with recent and contemporary rural and urban societies in all areas of the world through a variety of social scientific and humanistic techniques. Still others are biological and evolutionary, stressing human evolution and biological uniformity and diversity. In-depth field studies, excavations, laboratory analysis, the interpretation of symbol systems, and varieties of comparative methodologies are all part of anthropology.

Five introductory courses offer choices among the different strategies for doing anthropology. Four (Anthropology 112, 113, 114, and 116) explore major strategies for doing anthropology, lessons learned so far, and questions still pending. Anthropology III, Nature and Culture, focuses on the fundamental questions raised by all these approaches to anthropology—the issues that form the core of our concerns as anthropologists. The other departmental offerings deepen and broaden this basic knowledge. All anthropology courses with numbers below 500 are open to all students, unless otherwise stated in the course description.

The Major

Anthropology includes four subdisciplinary specializations: archaeological, biological, linguistic, and sociocultural anthropology. Aside from these specializations, anthropologists have also concentrated on a number of topics and problems, as well as on the study of the diverse peoples living in all regions of the world. The listing of courses (categories I–X) reflects these subdisciplinary specializations as well as the range of topics, problems, and world areas with which anthropologists at Cornell deal.

The student who majors in anthropology must take:

- 1) Anthropology 111 and one additional course at the 100 level, preferably during the freshman or sophomore years (Freshman Seminars in anthropology do not fulfill this requirement); and
- 2) Anthropology 300, The Discipline of Anthropology, during the fall term of the junior year.

In addition, the major is expected to develop one or more areas of concentration within the discipline in consultation with his or her faculty adviser.

To ensure some degree of exposure to the breadth and diversity of anthropology, the major must take:

- 3) Courses at the 200 level or above in at least two of the four subdisciplines (Category III—Archaeological Courses; Category IV—Biological and Ecological Anthropology; Category V—Linguistic Anthropology; Category VI—Sociocultural Anthropology);
- 4) At least one course at the 200 level or above in Category VII—Theory and History of Anthropology; and
- 5) At least one course in Category VIII that focuses on some world area.

A total of 32 credits of course work in anthropology beyond the introductory level is required of all majors; however, up to 8 credits of course work in cognate disciplines (see Category IX) may be accepted for the major with permission of the student's 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 spring 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 physical anthropology laboratory offers facilities for serology, anthropometry, osteology and primate dissection. A small statistical and reference library is maintained in the laboratory, as well as basic drafting and photographic equipment.

Special Programs

Specialized individual study programs are offered in Anthropology 497–498, Topics in Anthropology, open to a limited number of juniors and seniors who have obtained consent of the instructor. Undergraduates should also note that most 600-level courses are open to them if consent of the instructor is obtained. The Department of Anthropology holds colloquia throughout the academic year. Faculty members from Cornell and other universities participate in discussions of current research and problems in anthropology. Students are encouraged to attend.

I. Introductory Courses (including Freshman Seminars)

111 Nature and Culture Fall. 3 credits (4 by arrangement with instructor).

M W F 11:15. D. J. Greenhouse.

Anthropology arose as a novel attempt to address fundamental questions about humanity: Who are we? Where do we come from? Where are we going? Though it does not provide privileged answers to these questions, it approaches them through a unique combination of methods and a spirit of comparative inquiry. Informed by the long view gotten from the study of human evolution and culture history and the comparative view arising from the study of contemporary human biological and cultural diversity and uniformity, anthropology aspires to examine the relationships between the physical/biological, and symbolic/moral worlds in which we live. This course examines a variety of past and current attempts to explain the relationships between nature and culture in human life.

112 Social Anthropology Spring. 3 credits (4 by arrangement with instructor).

M W F 10:10. C. J. Greenhouse.

Among the ways they study human life, anthropologists examine social institutions in terms of their relationship to culture. Social anthropology is the study of social relationships and the ideas about existence implicit in them. In the course, we consider institutions—family, government, economics, religion, and so on—as contexts that define and are defined by social interactions. We explore the world's cultural diversity, as well as the question of what cultural differences mean. Most of the readings are first-hand accounts by ethnographers; films and discussions supplement the lectures.

113 The Comparison of Cultures Fall. 3 credits. (4 by arrangement with instructor).

T R 10:10–11:25. D. H. Holmberg.

An introduction to cultural anthropology through ethnographies or the descriptive accounts of anthropologists. Through readings and lectures students acquaint themselves intensively with a number of cultures from several parts of the world. The cultures range in form from those of small-scale tribal societies to those of state societies. Throughout the course we attempt to make sense of exotic cultures in their own terms. Attention is focused on variation in cultural forms as they are expressed in social, economic, and ritual practices. In this encounter, the principles of anthropology, as a comparative enterprise which poses distinct cultural systems in relief, will be developed. Fiction, films, and exercises supplement the formal anthropological materials.

114 Humankind: The Biological Background Fall. 3 credits (4 by arrangement with instructor).

T R 10:10–11:25. L. C. Jackson.

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 recent issues about human origins and antiquity, adaptations to past environments, sociobiology, biological variability in ancient and modern populations, and the biological basis for developing a diversity of cultural behaviors. Current controversies about the extent to which cultural and biological differences within *H. sapiens* reflect genetic differences will be discussed. Lectures are supplemented with films, laboratory-discussion sections, guest lecturers, and assigned readings.

116 Ancient Societies Fall. 3 credits (4 by arrangement with instructor).

M W F 9:05. J. S. Henderson.

An introduction to anthropological archaeology. Case studies provide detailed examples of methods used and problems encountered in reconstructing ancient societies. Cases represent a variety of time periods, world areas, and levels of cultural complexity, including hunting bands, farming villages, kingdoms without cities, and urban empires. The course illustrates the nature and diversity of archaeological evidence and the process of archaeological reasoning and provides a perspective for evaluating popular generalizations about cultural evolution.

121 Encounters with Other Cultures Fall. 3 credits. Freshman Seminar.

M W F 1:25. B. Lambert.

A survey of writings by anthropologists and other travelers who have told of their experiences as participants in other societies and as interpreters of foreign cultures. Ways of playing the outsider's role and changes in the traveler's own outlook are also discussed. Some of the lectures deal with the cultural contexts of the readings, and thereby provide an introduction to the materials of cultural anthropology.

125 The Anthropologist's America Fall. 3 credits. Enrollment limited to 15. Freshman Seminar.

R 2:30–4:25. R. Ascher.

The anthropologist, having experienced the cultures of others, views America with new eyes. This vision is presented in readings that range from the scientific article to the short story. Included are interpretations of contemporary American rituals, myths, arts, and work. Writing is limited to careful descriptions of things, processes, and scenes outside of one's ordinary experience. For example, one might observe and describe rituals of a religion other than one's own. Discussions focus on anthropological interpretations of the descriptions written by the people in the seminar.

130 Apes and Languages Spring. 3 credits. Freshman Seminar.

W 7:30–9:30 p.m. B. J. Isbell.

Extraordinary claims have been made about the language capacities of chimpanzees and gorillas. Are the apes talking? How does the sign language that has been taught to apes compare with natural spoken language of human beings? A selection of popular and scholarly books and articles will be examined in order to better understand the key issues in the debate over the language capacities of apes.

142 Rites of Passage Spring. 3 credits. Freshman Seminar.

M W F 2:30. P. S. Sangren.

Rites of passage are associated with transitions from one social role or status to another (e.g., child to adult, civilian to soldier, single to married). The seminar examines some literary and scientific treatments of such rites, both familiar and exotic, and the radical changes in consciousness that often accompany them. Cultural anthropology provides a broad framework for lectures and discussions, but students are also encouraged to relate topics raised in the course to their own experiences.

150 The Discovery of America Spring. 3 credits. Freshman Seminar.

T 12:20–2:15. C. Morris.

The discovery of the New World, beginning with American Indian origins in Asia and ending with the intellectual discoveries of European adventures, chroniclers, and travelers. Special attention is given to Norse exploration and settlement in the North Atlantic, the first Spanish encounters with the American land and people, and the exchange of flora and fauna.

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

Human cultural and social variability is explored through a series of ethnographic films, and readings and lectures relating to these films. The films are chosen to show peoples living in a variety of ecological situations and at different levels of social complexity in various parts of the world (i.e., Africa, Asia, Australia, the Americas). Readings and lectures will use the concepts and theories of cultural anthropology to interpret the significance of the different modes of life shown in the films.

II Courses Intended Primarily for Majors

300 The Discipline of Anthropology Fall. 4 credits. Limited to and required of anthropology majors, who must take this course during the junior year.

M W F 3:35. B. J. Isbell with the Anthropology faculty.

An overview of the field of anthropology; 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. This course will help the student plan course work in anthropology.

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.

[250 The Earliest Civilizations] Fall. 4 credits. Not offered 1981–82.]

[352 Interpretation of the Archaeological Record] Spring. 4 credits. Not offered 1981–82.]

354 Archaeology of the Americas I Fall. 4 credits.

T R 9:05; 50-minute sec to be arranged. T. F. Lynch.

A study of the prehistoric cultures of the New World. Major topics include the entry of man, early adaptations to diverse environments, hunting and gathering people to the ethnographic present, and the beginnings of agriculture.

355 Archaeology of the Americas II Spring. 4 credits.

T R 9:05; 50-minute sec to be arranged. T. F. Lynch.

A consideration of the origins, development, and spread of the native civilizations of Middle and South America. Prehistoric cultural developments in Mexico, Coastal America, and the Andes from the emergence of settled village life to the European discovery of the New World will be emphasized.

[358 Archaeological Research Methods (also Archaeology 358)] Fall. 4 credits. Not offered 1981–82.]

[361 Field Archaeology in South America (also Archaeology 361)] Fall. 10 credits. Not offered 1981–82.]

435 Investigation of Andean Institutions: Archaeological Strategies Spring. 4 credits.

Prerequisite: reading knowledge of Spanish.

Hours to be arranged. C. Morris.

A seminar considering the role of archaeology in the study of major questions regarding native Andean societies. Topics of current interest approached by selecting specific written sources that are archaeologically pertinent. Ways will be explored of using archaeological data to test and extend the written material. Past archaeological contributions to the understanding of Andean institutions will also be examined.

494 Seminar in Archaeology: Central America Fall. 4 credits.

R 10:10–12:05. J. S. Henderson.

An examination of the culture history of Central America, using ethnohistoric and ethnographic information on conquest period and modern societies to interpret the archaeological record of the pre-Hispanic period. Emphasis is on the question of whether or not a distinctive Central American cultural tradition can be recognized and on the nature of the cultural frontiers between Central America and neighboring regions.

IV. Biological and Ecological Anthropology

221 Human Biology: Variation and Adaptations of Contemporary Populations Fall. 4 credits.

M W F 10:10. L. C. Jackson.

A survey of important biological characteristics of the human species, with emphasis upon the range of genetic and nongenetic diversity among humans, the biocultural assessment of the concept of race, and evaluations of the biological and cultural adaptations of various modern populations to diverse and changing ecological constraints. The roles of such factors as disease, nutrition, and climatic stress in enhancing human variability will be discussed. Applied aspects of biological anthropology will also be an important part of the course.

375 Ecology and Human Biology Spring. 4 credits.

T R 10:10–11:25. L. C. Jackson.

An analysis of human physiological, developmental, genetic, and behavioral interactions with the abiotic and biotic environment, based on the principles of general ecology. Changes over time in human biological and cultural interactions with the environment will be discussed, as well as differences in adaptive strategies of contemporary human groups living in selected ecosystems. Films and assigned readings supplement the lectures.

[476 Human Behavior: A Sociobiological Perspective] Fall. 4 credits. Not offered 1981–82.]

V. Linguistic Anthropology

See also courses offered in linguistics, listed in the Modern Languages and Linguistics section.

[202 **Language and Culture** Fall. 4 credits. Not offered 1981–82.]

VI. Sociocultural Anthropology

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). Prerequisites: one year of introductory biology. This is part of the two-semester core course for the biology and society major and is also open to other students who have fulfilled the necessary prerequisites.

M W F 9:05. D. J. Greenwood.
Viewing human biology, behavior, and institutions as the ongoing products of the interactions between human biological evolution and cultural change, this course documents these interactions with reference to the following topics: the evolution of the capacity for culture; human groups and institutions; language, meaning, and cultural "realities"; and major models of human nature and human institutions.

302 Biology and Society II: Biology, Society, and Human Values (also Biological Sciences 302 and Biology and Society 302) Spring. 3 credits (4 by arrangement with instructor). Prerequisites: Anthropology, Biological Sciences, or Biology and Society 301. This is the second semester of a two-semester core course for the biology and society major and is also open to other students who have taken Anthropology 301 (Biological Sciences and Biology and Society 301).

M W F 9:05. D. J. Greenwood and S. Risch.
This course takes up the complex intellectual, practical, and ethical issues centering on the relationships between biological and social phenomena. Specific current issues such as pollution, genetic counseling, recombinant DNA research, and others will be taken up and an effort will be made to develop a viable biocultural ethics for dealing with such problems.

305 Psychological Anthropology Fall. 4 credits.
M W F 11:15. B. J. Isbell.

A consideration of problems selected to illustrate the mutual relevance of psychology and anthropology, concentrating on cross-cultural studies of cognitive and social development, with an emphasis on comparisons of socialization for sex roles.

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 (also Rural Sociology 355) Fall. 4 credits.

T R 10:10–11, 50-minute sec to be arranged.
M. L. Barnett.
What anthropology knows or suspects about some general processes of cultural change, and the application of these insights to practical and ethical problems faced in the planning, conduct, and evaluation of programs of intervention and change.

320 Meaning Across Cultures Fall. 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, and the differentiated arts and sports of nation states. Principles of language and culture, symbolic interpretation, and structuralism are introduced.

321 The Anthropology of Women and Gender (also Women's Studies 321) Fall. 4 credits.

M W F 2:30. K. S. March and D. H. Holmberg.
An introduction to the study of sex roles cross-culturally and to anthropological theories of sex and gender. The course examines various aspects of the place of the sexes in social, political, economic, ideological, and biological systems to emphasize the diversity in gender and sex-role definition around the world.

322 Comparative Religious Systems Spring. 4 credits.

T R 10:10–11:25. A. T. Kirsch.
A survey of anthropological approaches to the study of religion in simple and complex societies. Examines the role of religion in addressing intrinsic strains in personal and social life and in inhibiting or inducing social and cultural change.

323 Kinship and Social Organization Spring. 4 credits.

M W F 11:15. B. Lambert.
Much of this course is a survey of forms of the family, descent groups, and marriage systems. The role of age and sex in the social structure is also considered. The last part of the course is devoted to a history of the British and American family and to its fate in utopian communities.

325 Images of Exotics Spring. 4 credits.

T R 10:10–11:25. J. A. Boon.
A survey of texts and contexts in European explanations of tribal, Indic, and other non-Western populations. We explore topics across ancient, medieval, Renaissance, Enlightenment, and Romantic-comparativist anthropologies, including monstrosities, paradise, degradation, kingship, utopias, hermetics, nature, sexuality, marriage, language, economy, descent, authority, et cetera.

326 Economic Anthropology Fall. 4 credits.

M W F 10:10. P. S. Sangren.
Comparison of capitalist and noncapitalist economies and analysis of the cultural foundations of Western economic concepts.

328 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.

329 Politics and Culture Spring. 4 credits.

M W F 1:25. C. J. Greenhouse.
A cross-cultural examination of large-scale conflict and conflict resolution. We focus on power: its genesis, articulations, and functions in specific cultural contexts. Specific considerations include the politics of knowledge, the concept of self-interest, social organization (e.g., kinship), ethnicity, group decision making, and rhetoric. A continuation of Anthropology 328, but 328 is not a prerequisite.

[347 Peasant Cultures Fall. 4 credits. Not offered 1981–82.]

418 Ethnohistory Spring. 4 credits.

M W F 2:30. J. V. Murra.
Recent developments in ethnohistory of Andean, African, and Meso-American civilizations. Dynastic versus popular oral traditions and how to evaluate them. Accounts by alien eyewitnesses. Materials tested against concepts derived from field anthropology: status lineages, rights-in-land, settlement pattern, structural time, ethnohistory.

422 Special Problems in the Anthropology of Women (also Women's Studies 422) Fall. 4 credits.

R 2:30–4:25. D. H. Holmberg.
Each year this seminar focuses on a particular area of concern within the anthropology of women, building on the work done in Anthropology 321. The topic for fall 1981 is the position and meaning of women in practices associated with witchcraft, shamanism, spirit possession, and curing. The approach is comparative and considers these beliefs and practices ethnographically and historically in Western and non-Western societies.

[424 Myth, Ritual, and Sign Fall. 4 credits. Not offered 1981–82.]

[426 Ethnography of Communication Fall. 4 credits. Not offered 1981–82.]

451 Anthropological Boundaries Fall. 4 credits. S-U grades only. Enrollment limited to 15.

R 10:10–12:05. 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 science fiction. About half the course draws upon native North America. The rest is divided between imaginary cultures, Africa, Europe, and the contemporary United States. *Henderson the Rain King*, *Three Penny Opera*, and two movies about Navajos—one by commercial filmmakers and the other by Navajos—are examples of readings, listening, and viewings.

[452 Portraits, Profiles, and Life Histories Spring. 4 credits. Not offered 1981–82.]

[453 Constructions and Visualizations Spring. 4 credits. Not offered 1981–82.]

VII. Theory and History of Anthropology

[306 Ethnographic Description Spring. 4 credits. Not offered 1981–82.]

412 Contemporary Anthropological Theory Fall. 4 credits.

M W F 11:15. B. Lambert.
A survey of the assumptions social anthropologists make concerning the nature of society and culture, and the explanations they have proposed for regularities in social behavior, values, and belief systems. Among the approaches considered are processual analysis, the use of the concept of transaction, the historical method, ethnohistory, and structuralism.

413 History of Anthropology in the United States Fall. 4 credits.

T R 2:30–3:45. J. V. Murra.
Anthropological inquiries in the United States will be traced from the days of Morgan, Powell, and Fletcher through the professionalization of the discipline in the 1890s until today. Institutional developments and the personalities influential at crucial moments of innovation will be emphasized. The specific features that distinguish United States anthropology from the French, Soviet, Mexican, British, or Central European varieties will be sought.

[417 Structuralism Spring. 4 credits. Not offered 1981–82.]

[420 Development of Anthropological Thought Spring. 4 credits. Not offered 1981–82.]

425 Ritual Structures and Cultural Pluralism Fall. 4 credits.

T 2:30–4:25. J. A. Boon.

The course focuses on Indonesia plus other areas with Hindu-Buddhist and Islamic religious traditions. We examine ethnographies and novels that portray complexities of ritual, marriage, rank, and ethnic, religious, or cross-clan stereotypes. Colonial and postcolonial works by Bateson, Hocart, Rassers, Geertz, Dumont, Multatuli, Forster, and others are considered.

VIII. Area Courses

230 Ethnology of Native North America Fall. 4 credits.

M W F 10:10. C. F. Hockett.
A general survey of the ethnography of North America, with emphasis on problems and topics to which the North American materials are most relevant. Selected cultures will be considered in some detail.

318 Ethnohistory of the Northern Iroquois (also Agriculture and Life Sciences 318) Spring. 4 credits.

Hours to be arranged.
The development of Northern Iroquoian cultural patterns is examined in depth from the prehistoric Woodland period to the present day. Archaeological and ethnographic data are critically evaluated and combined both to trace the history of the Iroquois people and to enable their cultural ecology to be reconstructed. Supplemental information is drawn from accounts of neighboring groups in Southern Ontario and Western New England to provide a regional perspective and to fill gaps in the chronicles of the early contact period.

331 The United States Fall. 4 credits.

M W F 9:05. C. J. Greenhouse.
How do Americans define their own culture? Americans' testimony about themselves offers some central ideas: pluralism, egalitarianism, progress, the Revolution, the frontier, individualism, and "the American dream." The course examines these ideas as images, reaching for the cultural logic that makes them compelling. Readings draw on monographs, newspapers, social history, political speeches, and other sources. These readings will provide the framework for the students' own analyses and synthesis in discussion and in writing.

333 Ethnology of the Andean Region Fall. 4 credits.

M W F 2:30. J. V. Murra.
Cultural continuities in the development of Andean societies. The ecological, archaeological, ethnohistorical, and contemporary ethnological record. The Andean heritage as a resource for "modernization."

334 Ethnology of Island Southeast Asia Spring. 4 credits.

T R 10:10-11:25. J. T. Siegel.
Peoples and cultures of Indonesia and the Philippines will be discussed focusing on kinship, politics, and language and cultures.

[335 Ethnology of Mainland Southeast Asia Fall. 4 credits. Not offered 1981-82.]

[336 Ethnology of Oceania Fall. 4 credits. Not offered 1981-82.]

[338 Ethnology of Africa Spring. 4 credits. Not offered 1981-82.]

[342 Culture and Society in South Asia Fall. 4 credits. Not offered 1981-82.]

343 Traditional Chinese Society and Culture Fall. 4 credits.

M W F 1:25. P. S. Sangren.
Chinese society in the nineteenth and early twentieth centuries is considered in anthropological perspective. Major topics include family and kinship,

religion and values, traditional economy, cities, social stratification and mobility, social change, and local communities and their integration into larger regional systems. 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.

344 Modern Chinese Society Spring. 4 credits.

M W F 10:10. P. S. Sangren.
About 80 percent of the course is devoted to economy, society, and culture in the People's Republic of China. Major themes include continuity and change, societal integration, and the process of social transformation. The remaining 20 percent of the course examines other Chinese experiences, including Chinese society in Taiwan, Southeast Asia, and the United States.

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 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 1981-82.]

433 Andean Thought and Culture Spring. 4 credits.

R 2:30-4:25. B. J. Isbell.
Andean conceptual structures are explored in order to delineate key symbolic concepts underlying the organization of social and cosmological space, time, history, kinship, and political structure. Ethnohistorical and ethnographic research will be used to focus on the dynamics of change in Andean conceptual structures.

[456 Mesoamerican Thought and Culture Fall. 4 credits. Not offered 1981-82.]

IX. Related Courses in Other Departments

Introduction to Archaeology (Archaeology 100)

Popular Archaeology (Archaeology 107)

Archaeoastronomy (Archaeology 109)

Indian Lifeways of Ancient North America (Archaeology 111)

History of Archaeology (Archaeology 281)

Individual Study in Archaeology and Related Fields (Archaeology 300)

Archaeology of Africa (Archaeology 309)

Method and Theory in Stone Age Archaeology (Archaeology 317)

Human Paleontology (Biological Sciences 371)

Cross-Cultural Psychology (Sociology and Psychology 384)

Evolution of Prehistoric Technology (Archaeology 401)

Laboratory and Field Methods in Biological Anthropology (Biological Sciences 474)

Physical Anthropology: History and Theory (Biological Sciences 479)

Interpersonal and Social Stress and Coping (Sociology and Psychology 486)

X. Graduate Seminars

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

Southeast Asia Seminar: Burma (Asian Studies 601)

Southeast Asia Seminar: Philippines (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.

611 Principles of Social Anthropological Theory Spring. 4 credits.

T 2:30-4:25. J. A. Boon.
Comparative aspects of the works of Durkheim, Weber, Marx, Frazer, and other important figures are considered, with an eye toward concerted schools of anthropology, including Boasian approaches in America, functionalism in Britain, and *L'Année sociologique* in France.

[612 History of Anthropological Thought Spring. 4 credits. Not offered 1981-82.]

Methods of Assessing Child Growth (Nutritional Sciences 612)

619 Anthropological Approaches to the Study of Buddhism in Asia Fall. 4 credits.

T 2:30-4:25. K. S. March.
This seminar examines the various conceptual and analytical strategies employed by social scientists in the study of Buddhism in Southeast Asia, South Asia, and Tibet. Problems of religious complexity, the role of Buddhism in social change, and the social correlates of Buddhism, its institutions, and teachings will be explored.

[627 Law in the Context of Culture Spring. 4 credits. Not offered 1981-82.]

628 Political Anthropology: Culture and Revolution in Indonesia (also Government 647) Spring. 4 credits. Prerequisite: knowledge of Indonesian.

R 7:30 p.m. J. T. Siegel and B. R. Anderson.
Study of the relationship of politics to culture through the works of such authors as Iwan Simatupang, Pramoedya Ananta Toer, and Armin Pané.

Anthropometric Assessment (Nutritional Sciences 630)

632 Andean Symbolism Spring. 4 credits. Prerequisite: reading knowledge of Spanish.

Hours to be arranged. B. J. Isbell.
An examination of current research on Andean myths, rituals, and other symbolic systems such as conceptualizations of time and space. Both ethnohistorical and modern ethnographic research will be discussed.

633 Andean Research Fall and spring. 4 credits. Hours to be arranged. J. V. Murra.

634-635 Southeast Asia: Readings in Special Problems 634, fall; 635, spring. Credit to be arranged.

Hours to be arranged. J. A. Boon and A. T. Kirsch.

[638 Regional Systems and Local Communities Spring. 4 credits. Not offered 1981-82.]

645 Japanese Ethnology Spring. 4 credits. Strongly recommended: reading knowledge of Japanese.

Hours to be arranged. R. J. Smith.

This seminar is designed for advanced students who plan to conduct social science research in Japan. It deals with questions of historical continuity, the relationship of the individual to society, and the nature of contemporary Japanese social organizations.

[651 Anthropological Boundaries: Graduate] Spring. 4 credits. Not offered 1981–82.]

[653 Constructions and Visualizations: Graduate] Fall. 4 credits. Not offered 1981–82.]

663 Problems in Archaeology: Agricultural Origins Spring. 4 credits.
T 2:30–4:25. T. F. Lynch.

The ways botanists, geographers, and anthropologists have dealt with agricultural origins will be considered in historical perspective. Emphasis will be on agricultural systems rather than plant or animal morphology and taxonomy. The geographical focus will be America, with special attention to the Andes.

[664 Problems in Archaeology: Early Man in America] Spring. 4 credits. Not offered 1981–82.]

666 The Discovery of America Fall. 4 credits.
Prerequisite: Anthropology 150 or 354.
T 2:30–4:25. T. F. Lynch.

The European discovery of the American land and people, from the tenth through the sixteenth centuries. Topics emphasized include Norse exploration and settlement of the North Atlantic, the exchange of native flora and fauna, and the Native American's and European's view of each other.

[667 Origins of Mesoamerican Civilization] Spring. 4 credits. Not offered 1981–82.]

[677 Topics in Ecological Anthropology] Fall. 4 credits. Not offered 1981–82.]

681 Topics in Biomedical Anthropology Spring. 4 credits.
Hours to be arranged. L. C. Jackson.
A survey of the biological and cultural interactions in contemporary medical problems. Specific parasitological, nutritional, and genetic disorders are examined from the perspective of medical anthropology. Films, guest speakers, and laboratory sessions supplement the seminar format.

901–902 Field Research 901, fall; 902, spring.
Credit to be arranged.
Hours to be arranged. Staff.

Arabic and Aramaic

See Department of Near Eastern Studies, p. 159.

Archaeology

T. F. Lynch (anthropology), director; A. H. Bernstein (history), A. L. Bloom (geological sciences), R. G. Calkins (history of art), K. M. Clinton (Classics), J. E. Coleman (Classics), R. T. Farrell (English), J. S. Henderson (anthropology), P. I. Kuniholm (Classics), C. Morris (anthropology), J. V. M. urra (anthropology), G. W. Olson (agronomy), D. I. Owen (Near Eastern studies), A. Ramage (history of art), J. M. Weinstein (Classics)

Archaeology at Cornell is conceived as an interdisciplinary field. Cornell is one of the few universities in the United States to offer a separate major in archaeology and to maintain a faculty position for this purpose. The program is administered with the help and cooperation of the faculty members involved in archaeology in several departments. This group helps to coordinate course offerings and to find opportunities for fieldwork, professional positions, or graduate study.

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 on 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 prerequisites to the major a student must complete Archaeology 100 and another introductory archaeology course with grades of C or better. Once admitted to the major, the student must take an additional 30 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 20 credits at the 300 level or above
- 2) At least 6 credits in each of the categories below:
 - a) Theory and interdisciplinary approaches
 - b) Old World archaeology
 - c) New World archaeology

Beyond these 30 credits a student must elect at least 6 credits in related subjects outside the major, such as computer science, statistics, ethnology and history of appropriate areas, draftsmanship, photography, surveying and map making, interpretation of aerial photographs, paleography, and epigraphy.

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

Only students in other Cornell schools and colleges may elect a concentration in archaeology; they are eligible for Hirsch Scholarships in support of fieldwork. 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 above in section 2.

100 Introduction to Archaeology Spring. 3 credits.

M 4:15, W F 1:25. T. P. Volman.
The history, methods, and theory of archaeology are introduced. Lectures briefly outline the nature of archaeologically known cultures around the world to help illustrate the variety of archaeological sites and materials.

101 Introduction to Archaeology, Section Spring. 1 credit. Optional section to be taken concurrently with Archaeology 100. Prospective archaeology majors are expected to participate in this section, although it is open to all interested students.
M 1:25. Staff.

The main outlines of world archaeology are discussed briefly in terms of research problems. Seminars on particular archaeological cultures or topics are given by various archaeology staff members.

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

Popular conceptions of prehistory that have antagonized the archaeological establishment are focused on. Readings include both scholarly and popular books, careful and critical analysis of archaeological evidence is emphasized.

[108 The Origins and Diversity of the Family in Antiquity] Fall and spring. 3 credits. Freshman Seminar. Not offered 1981–82.

M W F 9:05. Staff.
The course concerns the study of ancient family units as cultural subsystems. We explore the range of forms and functions of the basic social unit, the family, as these are reflected in the archaeological record. Some of the theoretical questions we pursue are (1) evolutionary theories of the origin of the family, (2) the relationships between ecology and family structure, (3) the merits of approach to archaeological data and the reconstruction of ancient cultures through the methods of cultural history or through processual analysis.]

109 Astroastronomy Fall and spring. 3 credits. Freshman Seminar.

M W F 2:30. A. W. Wonderley.
Ancient peoples perceived and recorded celestial phenomena in their monuments, calendars, religions, and myths. It is clear that astronomical imagery has been an important component of human thought and it is possible that asterisms and celestial cycles dominated cosmological thinking until relatively recently. We survey the character of ancient astronomical knowledge manifested in the archaeological record. We shall also consider the extent to which sky lore of the past is embedded in time reckoning, language, and astrology of the present day.

300 Individual Study in Archaeology and Related Fields Fall or spring. Credit to be arranged.

Prerequisite: Archaeology 100 or permission of instructor.

Hours to be arranged. Staff.
Students pursue topics of particular interest with the guidance of a faculty member.

Theory and Interdisciplinary Approaches

Ancient Societies (Anthropology 116)

[The Earliest Civilizations (Anthropology 250)] Not offered 1981–82.]

[281 History of Archaeology] Fall. 3 credits. Not offered 1981–82.]

309 Archaeology of Africa: from Human Origins to Iron Age States Fall. 4 credits.
T R 2:30–3:45. T. P. Volman.

Dendrochronology of the Aegean (Classics 309)

313 Method and Theory in Stone Age Archaeology Fall. 4 credits.
T R 10:10–11:25. T. P. Volman.

311 Historical Archaeology: Method and Theory Fall. 4 credits.

T. R. 10:10–11:25. Staff.
A general introduction that draws examples from both Europe and North America. Theory and practical questions are addressed, including the use and interpretation of archival material. The approaches of the anthropologist and the historian are assessed using actual site reports as examples.

Geomorphology (Geological Sciences 345)

[Interpretation of the Archaeological Record (Anthropology 352)] Not offered 1981–82.]

358 Archaeological Research Methods (also Anthropology 358) Spring. 4 credits.

401 Evolution of Prehistoric Technology Spring. 4 credits.
M W F 9:05–10:10. T. P. Volman.

[Ceramics (History of Art 423)] Not offered 1981–82.]

Investigation of Andean Institutions: Archaeological Strategies (Anthropology 435)

Seminar in Archaeology: Central America (Anthropology 494)

[Architectural Problems in Archaeological Fieldwork (Architecture 540)] Not offered 1981–82.]

Problems in Archaeology: Agricultural Origins (Anthropology 663) Fall.

Old World Archaeology

Freshman Seminar in Archaeology (Classics 121)

[Mediterranean Archaeology (Classics 200 and Near Eastern Studies 262)] Not offered 1981–82.]

[Rise of Classical Greece (Classics 206)] Not offered 1981–82.]

Introduction to Classical Archaeology (Classics 220 and History of Art 220)

Minoan-Mycenaean Art and Archaeology (Classics 221 and History of Art 221)

Archaeology in Action I (Classics 232)

Archaeology in Action II (Classics 233)

[The History of Ancient Israel (Near Eastern Studies 243)] Not offered 1981–82.]

[Introduction to Art History: Art of Egypt and Mesopotamia (Near Eastern Studies 248 and History of Art 211)] Not offered 1981–82.]

275 Ancient Seafaring (also Near Eastern Studies 261) Fall. 3 credits.
T R 10:10–11:25. D. I. Owen.

[Introduction to Biblical Archaeology (Near Eastern Studies 263)] Not offered 1981–82.]

[310 Archaeology of the Ancient Near East (also Near Eastern Studies 366)] Spring. 4 credits.
Prerequisite: Archaeology 100 to permission of instructor. Not offered 1981–82.]

317 Archaeology of Ancient Europe Spring. 4 credits. Prerequisite: Archaeology 100 or consent of instructor.

[Archaeology of Classical Greece. (Classics 320 and History of Art 320)] Not offered 1981–82.]

[Archaeology of Cyprus (Classics 321 and History of Art 321)] Not offered 1981–82.]

[Arts of the Roman Empire (History of Art 322)] Not offered 1981–82.]

[Painting in the Greek and Roman World (History of Art 323)] Not offered 1981–82.]

[Greek Vase Painting (History of Art 325)] Not offered 1981–82.]

[Greek and Roman Coins (History of Art 327)] Not offered 1981–82.]

Greek Sculpture (Classics 329 and History of Art 329)

[Art in Pompeii: Origins and Echoes (History of Art 330)] Not offered 1981–82.]

History and Archaeology of Elba (Near Eastern Studies 362)

[Archaeology of Ancient Egypt (Near Eastern Studies 367)] Not offered 1981–82.]

The Vikings (English 601)

[Seminar in Aegean Archaeology (Classics 629)] Not offered 1981–82.]

[Seminar in Classical Greek Archaeology (Classics 630)] Not offered 1981–82.]

New World Archaeology

111 Indian Lifeways of Ancient North America 3 credits. Freshman Seminar. Fall.

T 12:20–2:15. S. Saraydar.
There is much that the archaeological record can tell us about the diverse cultural adaptations made by the Indians who explored and settled the North American continent long before the arrival of the first Europeans. The traces left by these ancient Americans are critically evaluated and then used to create realistic vignettes of prehistoric lifeways in which sensuous and intellectual perspectives are combined.

Archaeology of the Americas I (Anthropology 354) Fall.

Archaeology of the Americas II (Anthropology 355) Spring.

[Mesoamerican Thought and Culture (Anthropology 456)] Not offered 1981–82.]

Seminar in Andean Symbolism (Anthropology 632)

Seminar in Andean Research (Anthropology 633)

[Problems in Archaeology: Early Man in America (Anthropology 664)] Spring. Not offered 1981–82.]

Related Courses for Archaeology Majors

Plane Surveying (Agricultural Engineering 221)

Nature and Properties of Soils (Agronomy 200)

Identification, Appraisal, and Geography of Soils (Agronomy 301)

Geography and Appraisal of Soils of the Tropics (Agronomy 401)

Morphology, Genesis, and Classification of Soils (Agronomy 603)

The Discovery of America (Anthropology 150) Spring.

Ethnology of the Andean Region (Anthropology 333)

[Ethnology of Oceania (Anthropology 336)] Not offered 1981–82.]

Ethnohistory (Anthropology 418)

[Indians of Mexico and Central America (Anthropology 432)] Not offered 1981–82.]

Andean Thought and Culture (Anthropology 433) Fall.

Discovery of America (Anthropology 666)

Introductory Photography (Architecture 251)

Second-Year Photography (Architecture 351)

[Color Photography (Architecture 350 and Art 262)] Not offered 1981–82.]

Surveying for Archaeologists (Architecture 541)

[Case Studies in Preservation Planning (Architecture 544)] Not offered 1981–82.]

Documentation for Preservation Planning (Architecture 546)

The Greek Experience (Classics 211)

The Roman Experience (Classics 212)

[The Individual and Society in Classical Athens (Classics 222)] Not offered 1981–82.]

Computer Science 100, 101, 102, 104, and 211 may be of interest to some students (see the departmental listing for information about sequences and combinations).

Photogrammetry (Engineering CEE A661)

Image Analysis I: Landforms (Engineering CEE A687)

Scientific Illustration (Floriculture 417)

Introductory Geological Science (Geological Sciences 101)

Earth Science (Geological Sciences 103)

Earth Science Laboratory (Geological Sciences 105)

Structural Geology and Sedimentation (Geological Sciences 325)

Sedimentology and Stratigraphy (Geological Sciences 376)

Glacial and Quaternary Geology (Geological Sciences 642)

Ancient Greece From Homer to Alexander (History 265)

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

The Tragedy of Classical Athens (History 452)

The Crisis of the Greek City-State (History 453)

[The Roman Revolution (History 461)] Not offered 1981–82.]

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

[Hittite (Linguistics 621–622)] Not offered 1981–82.]

Elementary Statistics (Mathematics 372)

Statistics (Mathematics 472–473)

Elementary Akkadian (Near Eastern Studies 323–324)

[Folklore in the Ancient Near East (Near Eastern Studies 336)] Not offered 1981–82.]

Roots of Greek Civilization (Near Eastern Studies 346)

Independent Study: Ancient Israel (Near Eastern Studies 449)

History and Culture of Ancient Mesopotamia (Near Eastern Studies 363)

[Independent Study: Ancient Israel (Near Eastern Studies 469) Not offered 1981–82.]

Asian Studies

K. Brazell, chairperson and director of undergraduate studies; 150B Rockefeller Hall, 256–5095.
B. R. Anderson, D. E. Ashford, R. Barker, M. L. Barnett, M. G. Bernal, M. Bethe, J. A. Boon, S. Cochran, R. D. Colle, E. W. Coward, Jr., M. B. deBary, E. C. Erickson, J. W. Gair, M. D. Glock, A. G. Grapard, A. B. Griswold, E. M. Gunn, M. Hatch, D. Holmberg, F. E. Huffman, R. B. Jones, E. H. Jordan, 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, D. P. Mazingo, S. J. O'Connor, T. J. Pempel, D. E. Perushak, C. A. Peterson, C. Ross, P. S. Sangren, 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. A student majoring in Asian studies is required to complete two courses at the 200 level (a minimum of 6 credits) in one of the Asian languages offered at Cornell.

The Major

The applicant for admission to the major in Asian Studies must have completed at least one 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) 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 desire 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 seminar 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 (before 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 Asian 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 Asian 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. FALCON students spend six hours a day, five days a week, for periods 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, contact the FALCON Program Office, Department of Modern Languages and Linguistics, 203 Morrill Hall.

Freshman Seminars

[101 Women and Social Transitions in the Twentieth Century] Spring. 3 credits. B. deBary. Not offered 1981–82.]

103 Revolutions and Social Values in Modern Chinese Literature Spring. 3 credits.
M W 2:30–4. E. M. Gunn.

How Chinese writers in the twentieth century have used literature to affirm or dissent with social and political institutions and events in China from the collapse of the imperial dynasty to the present.

104 Three Ways of Thought Fall. 3 credits.
M W 2:30–4. T. L. Mei.

An introduction to Confucianism, Taoism, and Zen through reading and discussion of basic texts.

[105 Feminine and Masculine Ideals in Japanese Culture (also Women's Studies 105)] K. Brazell. Not offered 1981–82.]

Related Freshman Seminars in Other Departments

[Government 100 Contemporary Japan] 3 credits.
T. J. Pempel. Not offered 1981–82.]

History 192 Japan and the West Fall. 3 credits.
V. Koschmann.

History of Art 106 Art in a Landscape: The Traditional Arts of Southeast Asia Fall. 3 credits.
S. J. O'Connor.

General Education Courses

211 Introduction to Japan Fall. 3 or 4 credits.
M W 11:15, disc F 11:15 or 1:25. K. Brazell and staff.

An interdisciplinary introduction to Japanese culture especially designed for students not majoring in Asian studies. The first part of the course focuses on traditional aspects of Japanese culture, which are still important today, while the second part analyzes contemporary society from a variety of perspectives. Guest lecturers from five or six departments speak on their areas of expertise.

212 Introduction to China Spring. 3 or 4 credits.
M W 11:15, disc to be arranged. E. M. Gunn and staff.
An interdisciplinary introduction to Chinese culture especially designed for students not majoring in Asian studies.

Asia—Literature and Religion Courses

The following courses are taught entirely in English and are open to any Cornell student.

250 Dimensions of Religious Experience in Asia Fall. 3 credits.

T R 10:10–11:25. R. Birnbaum.

A systematic approach to various religious traditions of Asia within the context of experience: sacred time, sacred space, ritual behavior, pilgrimage, ideal types, death, relationships to the divine, religious language, sociocosmic systems, et cetera.

307 Asian Dance and Dance Drama (also Theatre Arts 307) Fall or spring. 3 credits.

[Section 1: *Indian Dance* Not offered 1981–82.]

Section 2: *Japanese Noh Theater*

M W F 12:20. M. Bethe.

The M and W classes focus on teaching the dance techniques used in noh. Students learn to perform short pieces from several plays. The Friday class discusses the noh theatre in more general terms, dealing with the plays, music, costumes, and props, and dance. Students read plays and articles about noh and view films and video tapes. There will be short papers and exams. The M and W classes may be taken without the F class, in which case, physical education credit may be earned, but not academic credit. Students who attend all three classes and do all work may earn both physical education credit and 3 units of academic credit.

313 The Japanese Film Spring. 3 credits.
W 7:30–9:30 p.m. plus film viewing W 4:30.

B. deBary.

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 two-fold: to enhance appreciation of film as an art form, and to use the formal analysis of the 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 Western or Hollywood codes.

[351 Early Buddhism] Fall. 4 credits. A. Grapard. Not offered 1981–82.]

[352 Mahayana Buddhism] Spring. 4 credits.
Prerequisites: Asian Studies 351, 355, or permission of instructor. Not offered 1981–82.]

[355 Japanese Religions] Fall. 4 credits. Not offered 1981–82.]

357 Chinese Religions Fall. 4 credits.
T R 2:30–3:45. R. Birnbaum.

A systematic approach to Chinese religions from the neolithic period to the twentieth century. Using historical and phenomenological approaches, the principle traditions of Confucianism, Taoism, and Buddhism as well as folk religious practices will be explored. Classical texts and scriptures in translation and the lives and teachings of exemplary masters will be explored with respect to topics such as city planning, aesthetics, and medicine and healing, and calendrical systems.

371 Chinese Philosophical Literature Spring. 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. T. L. Mei. Not offered 1981–82.]

[373 Twentieth-Century Chinese Literature] Fall. 4 credits. E. M. Gunn. Not offered 1981–82.]
See Society for the Humanities 417, The Role of Literature as Presented in Post-1949 Chinese Writing (fall) and 418, Cog or Scout: Functional Concepts of Socialist Literature (spring).

[374 Chinese Narrative Literature Spring.
4 credits. E. M. Gunn. Not offered 1981–82.]

375 Japanese Poetry and Drama Fall. 4 credits.
M W 2:30–3:35. K. Brazell.
A study of selected poets and dramatists in English translation. The course covers works from the eighth through the Manyōshū, imperial anthologies, the poetry of Saigyō, noh plays and haiku.

376 Modern Japanese Fiction 4 credits.
B. deBary. Not offered 1981–82.]

[377 Japanese Narrative Literature 4 credits.
K. Brazell. Not offered 1981–82.]

[379 Southeast Asian Literature in Translation
Not offered 1981–82.]

386 Folk Literature of East Asia Spring. 4 credits.
Hours to be arranged. D. McCann and J. McCoy.
A survey of the folk literature of China, Japan, and Korea within the context of a general consideration of genre, and of the nature of the relationship between folk literature and the literary arts.

400 The Japanese Noh Theatre and Modern Dramatists (also Comparative Literature 400)
Spring. 4 credits.

Hours to be arranged. 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.

For complete descriptions of courses numbered 600 and above, consult the graduate faculty representative.

601 Southeast Asia Seminar: Burma Fall.
4 credits.
Staff. Hours to be arranged. Contact Southeast Asia Program, 120 Uris Hall, 256–2378 for further information.

602 Southeast Asia Seminar: Philippines Spring.
4 credits.
Staff. Hours to be arranged. Contact Southeast Asia Program, 120 Uris Hall, 256–2378 for further information.

604 Southeast Asia Seminar (also International Agriculture 601, Philippine Agricultural Development)

611 Chinese and Japanese Bibliography and Methodology Fall. 1 credit. Prerequisite: permission of the instructor. Required of honors students and master of arts candidates.
Sec 1 (Chinese): W 9:05; sec 2 (Japanese): F 9:05.
D. Perushak.

[650 Seminar on Asian Religions Spring.
2–4 credits. Prerequisite: permission of the instructor.
Not offered 1981–82.]

676 Southeast Asia Research Training Seminar
See Southeast Asia Program, 120 Uris Hall, for more information.

701–702 Seminar in East Asian Literature 701, fall; 702, spring. 1 to 4 credits.
Hours to be arranged. Staff.

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
Either or both terms. 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.

For complete descriptions of courses numbered 600 or above, consult the graduate faculty representative.

605–606 Master of Arts Seminar in East Asian Studies 605, fall; 606, spring. 2–4 credits.
Hours to be arranged. E. Gunn and staff.

703–704 Directed Research 703, fall or spring; 704, fall or spring. Credit to be arranged. Staff.

Related Courses in Other Departments

Economics of Agricultural Development (Agricultural Economics 464)

Food, Population, and Employment (Agricultural Economics 660)

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)

Architecture in Its Cultural Context (Architecture 667–668)

The six courses listed above will count as College of Arts and Sciences credit only for Asian studies majors.

Urban Anthropology (Anthropology 313)

Meaning Across Cultures (Anthropology 320)

Images of Exotics (Anthropology 325)

Anthropological Approaches to the Study of Buddhism in Asia (Anthropology 619)

[Politics of Industrial Societies (Government 348)
Not offered 1981–82.]

Political Role of the Military (Government 349)

Comparative Revolutions (Government 350)

[The United States and Asia (Government 387)
Not offered 1981–82.]

[Seminar in Comparative Communism (Government 446) Not offered 1981–82.]

Field Seminar in International Relations (Government 606)

Graduate Seminar in Political Economy of Change: Rural Development in the World (Government 648)

Seminar in International Relations of Asia (Government 687)

Introduction to Asian Civilizations: Origins to 1600 (History 190)

Introduction to Asian Civilizations in the Modern Period (History 191)

Introduction to Art History: Asian Traditions (History of Art 280)

[Buddhist Art in Asia (History of Art 381) Not offered 1981–82.]

[Studies in Indian and Southeast Asian Art (History of Art 386) Not offered 1981–82.]

[Ceramic Art of Asia (History of Art 482) Not offered 1981–82.]

[Problems in Asian Art (History of Art 580) Not offered 1981–82.]

China—Area Courses

Traditional Chinese Society and Culture (Anthropology 343)

Modern Chinese Society (Anthropology 344)

Chinese Government and Politics (Government 347)

The Foreign Policy of China (Government 390)

[Readings on the Great Cultural Revolution (Government 447) Not offered 1981–82.]

[Chinese Political Readings (Government 448)
Not offered 1981–82.]

[Capitalism and Communism: Chinese and Japanese Patterns of Development (Government 462) Not offered 1981–82.]

[Politics of China (Government 645) Not offered 1981–82.]

Readings from Mao Ze Dong (Government 651)
Not offered 1981–82.]

China and the West before Imperialism (History 193)

[Chinese Views of Themselves (History 194) Not offered 1981–82.]

Early Warfare, East and West (History 360)

[Art and Society in Modern China (History 390)
Not offered 1981–82.]

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)

[Undergraduate Seminar: The First Chinese Revolution, 1880–1930 (History 494) Not offered 1981–82.]

Chinese Historiography and Source Materials (History 691)

Problems in Modern Chinese History (History 694)

Seminar in Medieval Chinese History (History 791–792)

Seminar in Modern Chinese History (History 793–794)

Introduction to the Arts of China (History of Art 380)

[The Arts of Early China (History of Art 383) Not offered 1981–82.]

[Chinese Painting (History of Art 385) Not offered 1981–82.]

[Chinese Art of the T'ang Dynasty (History of Art 483) Not offered 1981–82.]

[Studies in Chinese Painting (History of Art 486) Not offered 1981–82.]

The Role of Literature as Presented in Post-1949 Chinese Writing (Society for the Humanities 417)

Cog or Scout: Functional Concepts of Socialist Literature (Society for the Humanities 418)

Other courses dealing extensively with China are Anthropology 322; Government 347, 348, 350, 387, 446, and 645; History 190 and 191; History of Art 280, 381, 482, 580 and 496; and Architecture 667–668.

China—Language Courses

Basic Course (Chinese 101–102)

Cantonese Basic Course (Chinese 111–112)

Intermediate Chinese I (Chinese 201–202)

Chinese Conversation (Chinese 203–204)

Intermediate Cantonese (Chinese 211–212)

Intermediate Chinese (Chinese 301)

Intermediate Chinese III (Chinese 302)

Chinese Conversation—Intermediate (Chinese 303–304)

Intermediate Cantonese II (Chinese 311–312)

FALCON (full-time intensive course, Chinese 161–162)

History of the Chinese Language (Chinese 401–402)

Linguistic Structure of Chinese: Phonology and Morphology (Chinese 403)

[Linguistic Structure of Chinese: Syntax (Chinese 404) Not offered 1981–82.]

Chinese Dialects (Chinese 405)

Chinese Dialect Seminar (Chinese 607)

China—Literature Courses

Introduction to Classical Chinese (Chinese 213–214)

[Chinese Philosophical Texts (Chinese 313) Not offered 1981–82.]

Classical Narrative Texts (Chinese 314)

T'ang and Sung Poetry (Chinese 420)

Readings in Modern Chinese Literature (Chinese 411–412)

Directed Study (Chinese 421–422)

[Readings in Literary Criticism (Chinese 424) Not offered 1981–82.]

Readings in Folk Literature (Chinese 430)

[Seminar in Chinese Poetry and Poetics (Chinese 603) Not offered 1981–82.]

Seminar in Folk Literature (Chinese 609)

Advanced Directed Reading (Chinese 621–622)

Japan—Area Courses

Japanese Society (Anthropology 345)

Japanese Ethnology (Anthropology 645)

[Introduction to Japanese Economy (Economics 366) Not offered 1981–82.]

[Contemporary Japan (Government 100) Not offered 1981–82.]

Politics in Contemporary Japan (Government 346)

[Politics of Productivity: Germany and Japan (Government 430) Not offered 1981–82.]

[Capitalism and Communism: Chinese and Japanese Patterns of Development (Government 462) Not offered 1981–82.]

History of Japan to 1750 (History 397)

History of Modern Japan (History 398)

Seminar in Tokugawa Thought and Culture (History 489)

The Arts of Japan (History of Art 384)

Other courses dealing extensively with Japan are Anthropology 313; Government 334, 348, 387, 446, and 605; History 190, 191, and 192; History of Art 280, 381, 482, and 580; and Architecture 667–668.

Japan—Language Courses

Basic Course (Japanese 101–102)

Accelerated Introductory Japanese (Japanese 123)

Japanese for Business Purposes (Japanese 141–142)

Intermediate Japanese I (Japanese 201–202)

Japanese Conversation (Japanese 203–204)

Intermediate Japanese I and Conversation (Japanese 205–206)

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)

FALCON (full-time intensive course, Japanese 161–162)

Japan—Literature Courses

Introduction to Literary Japanese (Japanese 305–306)

Intermediate Literary Japanese (Japanese 405–406)

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 1981–82.]

Architecture in Its Cultural Context (Architecture 667–668)

[Government and Politics of India (Government 300) Not offered 1981–82.]

[India: A Political Experiment (Government 451) Not offered 1981–82.]

[Studies in Indian and Southeast Asian Art (History of Art 386) Not offered 1981–82.]

[India as a Linguistic Area (Linguistics 341) Not offered 1981–82.]

[Dravidian Structures (Linguistics 400) Not offered 1981–82.]

Indo-Aryan Structures (Linguistics 442)

[Comparative Indo-European Linguistics (Linguistics 631–632) Not offered 1981–82.]

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 425 and 628; Architecture 433; Asian Studies 250 and 351; Government 387, 605, and 687; History 190 and 191; History of Art 280, 386, 482, and 580; Agricultural Economics 464; Communication Arts 624 and 626; and Rural Sociology 751.

South Asia—Language Courses

Basic Course (Hindi-Urdu 101–102)

Hindi Reading (201–202)

Composition and Conversation (Hindi 203–204)

Readings in Hindi Literature (Hindi 301–302)

Advanced Composition and Conversation (Hindi 303–304)

Advanced Hindi Readings (Hindi 305–306)

[History of Hindi (Hindi 401) Not offered 1981–82.]

[Seminar in Hindi Linguistics (Hindi 700) Not offered 1981–82.]

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) Not offered 1981–82.]

Southeast Asia—Area Courses

Geography and Appraisal of Soils of the Tropics (Agronomy 401)

Ethnographic Films (Anthropology 205)

Applied Anthropology (Anthropology 314 and Rural Sociology 355)

Meaning Across Cultures (Anthropology 320)

Ethnology of Island Southeast Asia (Anthropology 334)

[**Ethnology of Mainland Southeast Asia** (Anthropology 335) Not offered 1981–82.]

[**Myth, Ritual, and Symbol** (Anthropology 424) Not offered 1981–82.]

Ritual Structures and Cultural Pluralism (Anthropology 425)

Anthropological Approaches to the Study of Buddhism in Asia (Anthropology 619)

Political Anthropology: Indonesia (Anthropology 628 and Government 647)

Southeast Asia: Readings in Special Problems (Anthropology 634–635)

Political Anthropology: Culture and Revolution in Indonesia (Anthropology 628 and Government 647)

[**Southeast Asian Literature in Translation** (Asian Studies 379) Not offered 1981–82.]

Southeast Asia Seminar: Burma (Asian Studies 601) Fall. 4 credits. Staff.

Southeast Asia Seminar: Philippines (Asian Studies 602) Spring. 4 credits. Staff.

Southeast Asia Seminar (Asian Studies 604; also International Agriculture 601, Philippine Agricultural Development)

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.

Micro-Economic Issues in Agricultural Development (Agricultural Economics 664)

Sociotechnical Aspects of Irrigation (Agricultural Economics 701, Agricultural Engineering 771, and Rural Sociology 754)

Administration of Agricultural and Rural Development (Business and Public Administration NCE 514, International Agriculture 603, and Government 692)

[**Economic Policy and Development in Southeast Asia** (Economics 365) Not offered 1981–82.]

Public Policy and Economic Development (Economics 371)

[**Economic Growth in Southeast Asia** (Economics 678) Not offered 1981–82.]

Southeast Asia Undergraduate Seminar (Government 300)

Government and Politics of Southeast Asia (Government 344)

Political Role of the Military (Government 349)

[**The United States and Asia** (Government 387) Not offered 1981–82.]

Political Anthropology: Culture and Revolution in Indonesia (Government 647, and Anthropology 628)

[**Political Problems of Southeast Asia** (Government 652) Not offered 1981–82.]

The United States and Southeast Asia (Government 687)

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)

Seminar in Southeast Asian History (History 795)

[**Seminar in Southeast Asian History** (History 796) Not offered 1981–82.]

Art in Landscape: The Traditional Arts of Southeast Asia (History of Art 106)

Introduction to Art History: Asian Traditions (History of Art 280)

[**Buddhist Art in Asia** (History of Art 381) Not offered 1981–82.]

[**Studies in Indian and Southeast Asian Art** (History of Art 386) Not offered 1981–82.]

[**Traditional Arts in Southeast Asia** (History of Art 488) Not offered 1981–82.]

[**Problems of Art Criticism** (History of Art 595) Not offered 1981–82.]

Seminar on Agricultural Development in Southeast Asia (International Agriculture 601) See also Asian Studies 604.

Special Studies of Problems of Agriculture in the Tropics (International Agriculture 602)

Comparative Methodology (Linguistics 404)

Sociolinguistics (Linguistics 405–406)

Field Methods (Linguistics 600)

Old Javanese (Linguistics 651–652)

Comparative Thai (Linguistics 752)

Seminar in Southeast Asian Languages (Linguistics 653–654)

Malayo-Polynesian Linguistics (Linguistics 655–656)

Seminar in Austro-Asiatic Linguistics (Linguistics 657–658)

Directed Research (Linguistics 701–702)

Thai Dialectology (Linguistics 751)

Comparative Thai (Linguistics 752)

Tibeto-Burman Linguistics (Linguistics 753)

Introduction to Musics of the World (Music 101)

Gamelan (Music 245–246)

The Study of Non-Western Musics (Music 389)

Gamelan Ensemble (Music 445–446)

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 701, and Agricultural Engineering 771)

Related Courses in Other Departments

Other courses dealing extensively with Southeast Asia are: Anthropology 306, 320, 325, 420, 611, 619, 628; Agricultural Economics 660; Agronomy 401; Architecture 667–668; Asian Studies 250, 351, 352, 650; Communication Arts 624, 626; Education 627, 629; Geological Sciences 424; Government 348, 349, 350, 605, 647, 692; History 190, 191; History of Art 482, 580; International Agriculture 600, 602, 603, 703; Nutritional Sciences 680, 695; and Rural Sociology 650.

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)

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)

FALCON (full-time intensive course, Indonesian 161–162)

Elementary Javanese (Javanese 131–132)

Intermediate Javanese (Javanese 133–134)

Intermediate Javanese Readings (Javanese 201–202)

Directed Individual Study (Japanese 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)****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)****Vietnamese Literature (Vietnamese 303–304)****Directed Individual Study (Vietnamese 401–402)**

Astronomy

Y. Terzian, chairman and director of undergraduate studies; 428 Space Sciences Building, 256–4935. S. Beckwith, J. M. Cordes, F. D. Drake, P. J. Gierasch, T. Gold, M. O. Harwit, J. R. Houck, S. T. Ostro, C. E. Sagan, E. E. Salpeter, S. Shapiro, S. Teukolsky, J. Veverka, I. 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 radiotelescope 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 two of these, Astronomy 331 and 332, require calculus and a year of college physics, and Astronomy 111–112 requires 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.

101 The Universe Beyond the Solar System Fall. 4 credits. Prerequisite: high school algebra.

Lecs, M W F 11:15; lab, M T or W 7:30–10 p.m. 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. Modern theories of the structure and evolution of the universe.

102 Our Solar System Spring. 4 credits.

Prerequisites: high school algebra and Astronomy 101 or permission of instructor.

Lec, M W F 11:15; lab, M T or W 7:30–10 p.m. Exams may be given in the evening. J. Veverka; labs, P. Gierasch.

Formation of the solar system. Surfaces, environments, and internal structures of planets and satellites. Evolution of the earth's crust, oceans, and atmosphere. Origin of life. Search for life in the solar system and elsewhere.

103 The Universe Beyond the Solar System Fall. 3 credits. This course does not satisfy the distribution requirement in physical sciences.

Identical to 101, except for omission of the laboratory (see description above).

104 Our Solar System Spring. 3 credits. This

course does not satisfy the distribution requirement in physical sciences.

Identical to 102, except for omission of the laboratory (see description above).

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; some evening observing periods.

J. R. Houck.

The formation and evolution of stars. Supernovae, pulsars, quasars, and black holes. The interstellar medium. The structure and evolution of galaxies. Cosmology.

112 Theories of the World: 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 average such 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. No prerequisites.

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 in animals; robots and artificial intelligence; transmission of information across the universe—astronomical data and communication with intelligent civilizations. Level of *Scientific American*.

321 Life in the Universe Spring. 4 credits.

Prerequisites: elementary course in physical or biological science; elementary calculus.

T R 2:30–3:45. F. D. Drake.

The theories of life in the universe: aspects of stellar evolution relevant to biology; nucleosynthesis; theories of planetary formation; evolution of planetary surfaces and atmospheres; chemical evolution on earth-like planets; evolution of intelligent and technological life. Cosmic limitations on technology. Methods to detect extraterrestrial life, particularly through radio observations; optimization of search methods; hypothetical communication systems.

332 Elements of Astrophysics Spring. 4 credits.

Prerequisites: calculus; Physics 213. Physics 214 strongly recommended.

Lecs, M W F 11:15. S. Beckwith.

An introduction to astronomy with emphasis on the application of physics to the study of the universe. Physical laws of radiation. Theories of the solar system. Distance, size, mass, and age of stars, galaxies, and the universe; stellar evolution and nucleosynthesis; interstellar matter and star formation. Supernovae, pulsars, and black holes. Galaxies and quasars. Introduction to cosmology. Intended for students interested in astronomy, physics, and engineering.

431 Introduction to Astrophysics and Space

Sciences I Fall. 4 credits. Prerequisites: Physics 214 and 318 or their equivalent. There are no astronomy course prerequisites.

M W F 10:10. J. R. Houck, S. Beckwith.

A systematic development of modern astrophysical concepts for physical science majors. Atomic and electromagnetic processes in space. Introduction to star formation, stellar structure, stellar atmospheres, and the interstellar medium. At the level of *Astrophysical Concepts* by Harwit.

432 Introduction to Astrophysics and Space

Sciences II Spring. 4 credits. Prerequisite: Astronomy 431 or permission of instructor.

M W F 10:10. J. Cordes.

Formation of the chemical elements. Origin of the solar system; stellar evolution; white dwarfs, neutron stars, and black holes; stellar systems, clusters, galaxies, and quasars. Cosmology. At the level of *Astrophysical Concepts* by Harwit.

[433 The Sun Fall. Not offered 1981–82.]**434 The Evolution of Planets** Fall. 4 credits.

Prerequisites: Physics 214 and 318 or consent of instructor.

M W F 11:15. J. Veverka.

An introduction to the physical and chemical processes that have been active in altering the environments of planets and satellites from their original to their present state. Theories of the formation of the solar system are reviewed, with special emphasis on chemical differentiation of the primeval solar nebula. A critical assessment is made of how well the various theories account for the clues left in the meteorite record, and how well they explain the current environments of the planets and satellites. The main ideas about the formation and evolution of terrestrial planets, satellite systems, and asteroids are considered in detail. Some specific topics included are: the history of the earth-moon system; the probable evolution of Jupiter's Galilean satellites; and the comparative histories of Venus, Earth, and Mars.

440 Independent Study in Astronomy Fall or spring. 2–4 credits. Prerequisite: consent of instructor. Recommended: familiarity with the topics covered in Astronomy 332, 431, or 434.

Hours to be arranged. Staff.
Individual work on selected topics. A program of study is devised by the student and instructor.

[490 Senior Seminar Fall. Not offered 1981–82.]

[509 General Relativity (also Physics 553) Fall. Not offered 1981–82.]

[510 Applications of General Relativity (also Physics 554) Spring. Not offered 1981–82.]

511 High-Energy Astrophysics Spring. 3 credits.

Hours to be arranged. S. Shapiro, I. Wasserman.
The physics of white dwarfs, neutron stars, and black holes. The formation of compact objects; 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.

[516 Galactic Structure and Stellar Dynamics Spring. Not offered 1981–82.]

520 Radio Astronomy Fall. 4 credits.

T R 2:30–3:45. F. Drake and S. Ostro.
Radio astronomy telescopes and electronics; antenna theory; observing procedures and data analysis; concepts of interferometry and aperture synthesis. Radar astronomy techniques. Theories of radio emission; synchrotron emission and thermal emission; applications to the theory of radio sources. Radio astronomy of the solar system. The search for extraterrestrial intelligence.

521 Radio Astrophysics Spring. 4 credits.

T R 2:30–3:45. J. Cordes and staff.
Thermal and nonthermal radiation processes. Emission from the interstellar medium, giant molecular clouds, planetary nebulae, novae, supernovae, pulsars, radio galaxies, quasars. Cosmic blackbody radiation. Galactic structure and kinematics from 21-cm line emission. Models for pulsar magnetospheres, double radio galaxies, and quasi-stellar objects. Observational cosmology.

[523 Signal Processing in Astronomy Spring. Not offered 1981–82.]

[555 Theory of the Interstellar Medium (also Physics 665) Fall. Not offered 1981–82.]

560 Theory of Stellar Structures and Evolution (also Physics 667) Fall. 4 credits.

M W F 2:30. E. Salpeter, I. Wasserman.
Summary of observational facts on stars; dimensional analysis; nuclear reactions and energy transport in stellar interiors; models for static and evolving stars. At the level of *Principles of Stellar Evolution and Nucleosynthesis* by Clayton.

[571 Mechanics of the Solar System (also Engineering T&AM 673) Spring. Not offered 1981–82.]

[575 Radiative Transfer and Planetary Atmospheres Fall. Not offered 1981–82.]

579 Celestial Mechanics (also Engineering T&AM 672) Fall. 3 credits.

Two 1¼-hour lec 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. Perturbation equations: effects of gravitational potentials, atmospheric drag, and radiation forces on orbits. Secular perturbations, resonance problems.

[620 Seminar: Advanced Radio Astronomy Fall. Not offered 1981–82.]

633 Seminar: Infrared Astronomy Fall; offered when there is sufficient demand. 2 credits.

M. Harwit.
Techniques of modern infrared astronomical observation; emission mechanisms of cosmic infrared radiation; infrared observations of planets, stars, nebulae, galaxies, and cosmic background radiation.

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 Engineering A&EP 608) Spring. Not offered 1981–82.]

671 Special Topics in Planetary Astronomy: The Saturn System Fall. 3 credits.

W 11:30–1:30. C. Sagan.
Topics vary. The course has focused on such topics as the interiors of planets; Martian exploration; cosmic chemistry and exobiology; and instrumental techniques.

[673 Seminar: Current Problems in Planetary Fluid Dynamics Spring. Not offered 1981–82.]

[680 Seminar: Cosmic Rays and High-Energy Electromagnetic Radiation (also Physics 680) Spring. Not offered 1981–82.]

699 Seminar: Current Problems in Theoretical Astrophysics Fall. 3 credits. May be repeated for credit.

T R 10:10–11:35. S. Shapiro.
Study of the latest problems in theoretical astrophysics; content change from year to year.

Biological Sciences

R. H. Barker, director; H. T. Stinson, associate director and director of undergraduate studies, 118 Stimson Hall, 256–5233; S. D. Miller, assistant director of undergraduate studies, Biology Center, G20 Stimson Hall, 256–3358.

Biology is an extremely popular subject at many universities for a variety of reasons: it is a science that is in an exciting phase of development; it prepares students for careers in challenging and appealing fields such as human and veterinary medicine and environmental sciences; and it deals with the inherently interesting questions that arise when we try to understand ourselves and the living world around us. Many of the decisions we face today deal with the opportunities and problems that biology has put before us.

At Cornell the program of study in biology is offered by the Division of Biological Sciences to students enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences.

The biology program is designed to enable students to acquire necessary scientific foundations, to become familiar with different aspects of modern biology, and then to concentrate in a specific area of biology. Areas of concentration include animal physiology and anatomy; biochemistry; botany; cell biology; ecology, systematics, and evolution; genetics and development; or neurobiology and behavior. Special programs are available for qualified students with particular interest in areas such as marine biology, nutrition, microbiology, biophysics, or general biology. For more details see the Division of Biological Sciences section.

Burmese, Cambodian, and Cebuano (Bisayan)

See Modern Languages, Literatures, and Linguistics, p. 140.

Chemistry

R. Hoffmann, chairman and director of undergraduate studies, 122 Baker Laboratory, 256–4174.

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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 and pharmaceutical companies. A major in chemistry can provide the basis for significant work in related areas, such as molecular biology, chemical physics, geochemistry, chemical engineering, and solid-state physics.

A major in chemistry permits considerable flexibility in the detailed planning of a course program. The required courses can be completed in three years, leaving the senior year open for advanced and independent work under the supervision of a professor.

The courses are arranged as a progression, with some courses (including mathematics and physics) prerequisite to those that are more advanced. During the first year the student should normally register for general chemistry (preferably but not necessarily Chemistry 215), mathematics, a freshman seminar course, a foreign language if necessary, or, in some instances, physics. Although Chemistry 215–216 is preferred, students may begin their programs with Chemistry 207–208. Chemistry 215–216 is limited to those students with good preparation and a strong interest in chemistry. Students who do not know if their preparation is adequate should consult the instructor. In the second year the student should complete calculus and take physics and organic chemistry. (Chemistry 359–360 is preferred to Chemistry 357–358). The second-year laboratory courses include 300, Quantitative Chemistry, if needed, and 301, Experimental Chemistry I; 389–390, Physical Chemistry I and II, and 302–303, Experimental Chemistry II and III, which should be completed in the third year. Advanced work in chemistry and related subjects can be pursued in the fourth year and, to some extent, in the earlier years as well. The opportunity for independent research is also available. All students with questions about details of a major program are encouraged to consult the chairperson of the Department of Chemistry or the chairperson's representative. Entering students who are exceptionally well prepared in chemistry may receive advanced placement credit for Chemistry 207–208 and proceed to a more advanced program.

Prerequisites for admission to a major in chemistry are (1) Chemistry 215–216 or 207–208 plus 300; (2) Physics 207; and (3) Mathematics 111 or 191.

Students are not encouraged to undertake a major in chemistry unless they have passed those prerequisite courses at a good level of proficiency. Knowledge of simple computer programming is essential. This may be achieved either by self-study (a syllabus is available) or by taking courses such as Computer Science 100. The minimum additional courses that must be completed for a major in chemistry are listed below.

- 1) Chemistry 301, 302, 303, 359–360 (or if necessary, 357–358 may be substituted), and 389–390
- 2) Mathematics 112 plus 214, 215, 216, 217, or 122 plus 221, 222; or 192 plus 293, 294
- 3) Physics 208

Potential majors electing to take the mathematics sequence 214–217 are strongly urged to do so in their sophomore year to avoid scheduling conflicts with Chemistry 389 in their junior year.

This sequence is a core program in chemistry. It is anticipated that students will, through elective courses, extend it substantially in whatever direction suits their own needs and interests. It is particularly important that those going on to do graduate work in chemistry recognize that these requirements are minimal, and such students are strongly urged to supplement their programs, where possible, with Chemistry 404, 405, 605, 606, 607, 668, 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 high 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, high 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.

Students and members of the teaching staff are required to wear safety glasses or approved eye-protective devices in all chemistry laboratories. Those who fail to cooperate with the safety program may 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.

Course Information

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.

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: 6:30–8 p.m. Oct. 15, Nov. 19, March 4, April 15. Fall, H. A. Scheraga; spring, J. E. McMurry.

An introduction to chemistry with emphasis on the important principles and facts of inorganic and organic chemistry.

[200 Man in His Chemical Environment] Fall. 3 credits. Prerequisites: 103–104 or 207–208. Enrollment limited. Offered alternate years. Not offered 1981–82.

Lec T R 12:20; rec, T 1:25 or R 10:10 or 1:25. The chemical aspects of the human environment, including the composition and properties of materials as these affect our environment. Chemical limitations on the balance between survival and quality of living.]

202 Origins of Life Spring. 3 credits.

Prerequisites: 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.

Lecs and discs, 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.

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 207: high school chemistry. Prerequisite for 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: 6:30–8 p.m. Oct. 13, Nov. 17, March 2, April 13. Fall, B. Widom and M. J. Sienko; spring, R. C. Fay and L. Que.

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. Coregistration in a calculus course at the level of Mathematics 111 or 191 is required 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 or rec, 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: 6:30–8 p.m. Sept. 24, Oct. 29, Nov. 24, Feb. 18, March 9, April 22. Fall, B. A. Baird and G. G. Hammes; spring, R. F. Porter and 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 nonchemistry 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: 6:30–8 p.m. Oct. 22, Nov. 19. D. B. Collum.

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.

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. B. K. Carpenter. A continuation of Chemistry 251.

253 Elementary Organic Chemistry Fall.

4 credits. Primarily for students in the premedical and biological curricula. Enrollment 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: 6:30–8 p.m. Oct. 1, Oct. 29, Nov. 24. J. E. McMurry.

The occurrence and properties of organic molecules and the mechanisms of organic reactions, including a brief introduction to the organic chemistry of biological systems, are studied.

Note: 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.

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 288: Chemistry 287.

Lecs, M W F 9:05; rec, M W or F 1:25. Fall, E. R. Grant; spring, B. Baird. A systematic treatment of the fundamental principles of physical chemistry.

289–290 Introductory Physical Chemistry Laboratory 289, fall; 290, spring. 2 credits each term. Prerequisite for 290: Chemistry 289.

Coregistration in 287–288 is required. Lec, T or R 1:25; lab, M T W R or F 1:25–4:25. Fall, J. R. Wiesenfeld; spring, A. C. Albrecht. 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 or F 1:25–4:25 or T R 8–11. Weekly optional recs may be offered. Organizational meeting on first class day of semester, 12:20. G. H. Morrison.

Common quantitative procedures and techniques essential to laboratory work in the sciences are emphasized. The relationships between theories and applications are stressed.

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 T R 1:25–4:25. J. R. Rasmussen.
An introduction to synthesis and the separation and handling of materials, including applications of many types of chromatography, simple and fractional distillation, crystallization, extraction, and others.

302 Experimental Chemistry II Fall. 4 credits. Enrollment limited; preference given to chemistry majors. Prerequisite: Chemistry 301.

Lecs, M W 9:05; 2 labs, M W 1:25–4:25, T R 9–12, T R 1:25–4:25, or F 1:25–4:25 and S 9–12.
J. M. Burlitch, C. F. Wilcox.
Various aspects of qualitative and quantitative analysis of both inorganic and organic compounds, including optical spectroscopy, atomic absorption, NMR, mass spectroscopy, GCMS, and electrochemical methods are surveyed.

303 Experimental Chemistry III Spring. 4 credits. Each lab limited to 18 students. Prerequisites: Chemistry 302, 389, 390; coregistration in the latter is permissible; knowledge of computer programming is essential.

Lecs, M W 9:05 (some weeks lec may be on F instead of W); 2 labs, M W 1:25–4:25 or T R 8–11 or 1:25–4:25. P. L. Houston, R. F. Porter.
An introduction to the techniques of vacuum line construction and operation; the principles and assembly of electronic measuring devices, optics, and kinetics.

357–358 Introductory Organic Chemistry 357, fall; 358, spring. 3 credits each term. Prerequisites: Chemistry 208 or 216 or advanced placement in chemistry. Concurrent registration in Chemistry 251 in the fall term or Chemistry 301 in the spring term is recommended. Prerequisite for Chemistry 358: Chemistry 357.

Lecs, M W F 9:05; optional rec may be offered. Fall, J. Meinwald; spring, J. C. Clardy.
A systematic study of the more important classes of carbon compounds—reactions of their functional groups, methods of synthesis, relations, and uses.

359–360 Organic Chemistry I and II 359, fall; 360, spring. 4 credits each term. Recommended for students who intend to specialize in chemistry or closely related fields. Enrollment limited. Prerequisites: Chemistry 216, or 208 with a grade of B or better, or consent of instructor. Prerequisite for Chemistry 360: Chemistry 359.

Lecs, M W F 9:05; make-up lecs, W 7:30 p.m. M. J. Goldstein.
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: 8:40–10:30 p.m. Sept. 24, Oct. 15, Nov. 12, Dec. 10, Feb. 18, March 18, April 15. Fall, P. L. Houston; spring, H. A. Scheraga.
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 1981–82.

Lab, M T R 1:25–4:25; plus occasional evening lec. Alternate 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. 4 credits. Enrollment limited. Prerequisite: Chemistry 302. Selection of students is 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: 12 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 p.m. 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.

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.
Informal advanced laboratory and library work, planned in consultation with a staff member, preparing and characterizing inorganic substances and culminating in a written report.

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.
Informal research in analytical chemistry involving both laboratory and library work.

461 Introduction to Organic Research Fall or spring. 2–4 credits. Enrollment limited to those having a record of B– or better in prerequisite courses. Prerequisites: Chemistry 302 and 358 or 360 or permission of instructor.

Selected faculty.
Informal research in organic chemistry involving both laboratory and library work.

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.
Informal laboratory and library work in physical chemistry, planned in consultation with a staff member.

498 Honors Seminar Spring. Noncredit. 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.

G. H. Morrison.
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 General Chemistry Colloquium Fall and spring. Noncredit. Required of all graduate students except those majoring in organic or bioorganic chemistry. Open to qualified juniors and seniors. R 4:40.

A series of talks representative of all fields of current research interest in chemistry other than organic chemistry, given by research associates, faculty members, and distinguished visitors.

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 Application 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: Structure and Dynamics] Spring. 4 credits. Prerequisite: Chemistry 605 or permission of instructor. Not offered 1981–82.

Lecs, M W F 9:05.
The second of a three-term sequence. The development of general background and systematics through which structure, stereochemistry, and reaction mechanism of inorganic and organometallic compounds can be understood and anticipated. Readings at the level of Coates, Green, and Wade's *Organometallic Compounds* and Basolo and Pearson's *Inorganic Reaction Mechanisms*.]

607 Advanced Inorganic Chemistry III: Structure and Properties Spring. 4 credits. Prerequisite: Chemistry 605 or permission of instructor.

Lecs, M W F 9:05. M. J. Sienko.
The third of a three-term sequence. Introduction to ligand field theory and solid-state structure and properties, at the level of Figgis' *Introduction to Ligand Fields*. Krebs' *Fundamentals of Inorganic Crystal Chemistry* and Sach's *Solid State Theory*. Readings in transition metal chemistry at the level of Cotton and Wilkinson's *Advanced Inorganic Chemistry*.

622 Chemical Communication (also Biological Sciences 623) Fall. 3 credits. Intended primarily for research-oriented students. Limited to 30 students. Prerequisites: Chemistry 358, Biological Sciences 102, and Biochemistry 231. Offered alternate years.

Lecs, M W F 1:25. J. Meinwald, T. Eisner, W. Roelofs, and guest speakers.
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 equivalents.

Lecs, M W F 8; exams, T 7:30 p.m. W. D. Cooke, F. W. McLafferty, J. C. Clardy.
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. Offered alternate years.

Lecs, T R 10:10; problem sessions and exams, T 7:30. F. W. McLafferty.
Modern analytical methods, including electron, Mössbauer, 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 equivalents. Offered alternate years. Not offered 1981–82.

Lecs, T R 10:10. G. H. Morrison.

Modern trace, micro, and surface methods of analysis, including atomic spectrometry, solid mass spectrometry, activation analysis, microscopes, microprobes, and electron spectroscopy.]

650–651 Organic and Organometallic Chemistry Seminar 650, fall; 651, spring. Noncredit. Required of all graduate students majoring in organic or bioorganic chemistry. Open to qualified juniors and seniors.

M 8:15 p.m.

A series of talks representative of all fields of current research interest in organic and organometallic chemistry, given by research associates, faculty members, and distinguished visitors.

665 Advanced Organic Chemistry Fall. 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisites: Chemistry 253 or 358 or 360 and 390 or equivalents or permission of instructor.

Lecs, M W F 12:20; make-up lectures and exams, W 7:30 p.m. B. K. Carpenter.

A survey of reaction mechanisms and reactive intermediates in organic chemistry. Applications of qualitative molecular orbital theory are emphasized.

666 Synthetic Organic Chemistry Spring. 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisites: Chemistry 665 or permission of instructor.

Lecs, M W F 10:10; additional lec to be arranged. D. B. Collum.

Modern techniques of synthesis; applications of organic reaction mechanisms to the problems encountered in rational multistep synthesis, with particular emphasis on modern developments in synthetic planning.

[668 Chemical Aspects of Biological Processes] Fall. 4 credits. Prerequisites: Chemistry 358 or 360 and 390 or 288 or equivalents. Not offered 1981–82.

Lecs, M W F 10:10.

Biochemical systems, bioenergetics, enzymes, metabolic pathways, chemical evolution. This course forms the chemical basis for the graduate program in molecular biology.]

672 Enzyme Catalysis and Regulation Spring. 4 credits. Primarily for graduate students in chemistry and biochemistry. Prerequisites: Chemistry 358 or 360 and 390 or equivalents, and a course in general biochemistry.

Lecs, M W F 9:05 and occasionally W 7 p.m.

G. G. Hammes.

Protein structure and dynamics, steady-state and transient kinetics, binding isotherms, chemical modification enzymes, application of NMR, EPR, and fluorescence, acid-base catalysis, allosterism; discussion of specific enzymes to illustrate general principles.

677 Chemistry of Nucleic Acids Fall. 4 credits. Primarily for graduate students. Prerequisites: Chemistry 358 or 360, and 390 or equivalents. S-U grades only. Offered alternate years.

Lecs, M W F 8. D. A. Usher.

Properties, synthesis, and reactions of nucleic acids.

678 Thermodynamics Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 or equivalents.

Lecs, T R 8:30–9:55; disc to be arranged.

B. Widom.

Development of the general laws of equilibrium thermodynamics. Applications to the study of physicochemical equilibrium in gases, liquids, solids, and liquid solutions.

681 Physical Chemistry III Fall. 4 credits. Prerequisites: Chemistry 288 or 390; Mathematics 214, 215, 216, 217, and Physics 208; or equivalents.

Lecs, M W F 10:10 and occasionally W 7:30 p.m.

A. C. Albrecht.

An introduction to the principles of quantum theory and statistical mechanics, atomic and molecular spectra, and elementary valence theory. At the level of *Atoms and Molecules* by Karplus and Porter.

[686 Physical Chemistry of Proteins] Spring. 4 credits. Primarily for graduate students. Prerequisites: Chemistry 288 or 390 or equivalents. Offered alternate years. Not offered 1981–82.

Lecs, M T W R F 8 and occasionally W 7:30 p.m.

H. A. Scheraga.

Chemical constitution, molecular weight, and structural basis of proteins; thermodynamic, hydrodynamic, optical, 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. Noncredit.

H. B. Gray, California Institute of Technology.

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. Noncredit. Required of all first-year graduate students majoring in analytical, inorganic, physical, theoretical, and biophysical chemistry.

Hours to be arranged. F. W. McLafferty.

716 Selected Topics in Advanced Inorganic Chemistry Fall. 3 credits. Prerequisite: Chemistry 390 or equivalent.

Lecs, T R 12:20. B. K. Carpenter.

Topics vary.

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 1981–82.

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 1981–82.

Lecs, M W 11:15

Topics vary.]

[774 Chemistry of Natural Products] Spring. 3 credits. Primarily for graduate students.

Prerequisites: Chemistry 665–666. Not offered 1981–82.

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 Fall.

4 credits. Prerequisite: Chemistry 681 or permission of instructor.

Lecs, T R 10:10–12:10 and occasionally T 7 p.m.

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 1981–82.

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.

Hours to be arranged. 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*.

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. J. H. Freed.

Schrödinger'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 10:10. J. H. Freed.

Time-dependent phenomena in quantum mechanics and interaction with radiation. Group theory and applications in molecular spectroscopy and electronic structure of atoms and molecules. At the level of Tinkham's *Group Theory in Quantum Mechanics*.

796 Statistical Mechanics (also Physics 562)

Spring. 4 credits. Primarily for graduate students.

Prerequisite: Chemistry 793 or equivalent.

Lecs, T R 8:30–9:50. M. E. Fisher.

Thermodynamic assemblies; Legendre transformation. Ergodic and information theory ideas. Ensembles and partition functions; equivalences and fluctuations; indistinguishability. Thermodynamic properties of ideal gases and crystals; Third Law; chemical equilibria. Imperfect gases; correlation functions and their applications. Ideal quantal gases; Bose-Einstein condensation. Ideal paramagnets. Ising models and lattice gases. At the level of Kubo's *Statistical Mechanics*.

[798 Selected Topics in Physical Chemistry] Spring. 3 credits.

Lecs, T R S 9:05. Not offered 1981–82.

Topics vary. In spring 1982 the topic will be the electronic structure of organic, organometallic, and inorganic molecules.]

Chinese

See Departments of Asian Studies p. 98, and Modern Languages, Literatures, and Linguistics, p. 140.

Classics

K. Clinton, chairman; L. S. Abel, F. M. Ahl, R. J. Burton, J. E. Coleman, M. L. Cook, J. R. Ginsburg, director of undergraduate studies, G. M. Kirkwood, P. M. Kirkwood, P. I. Kuniholm, G. M. Messing, P. T. Mitsis, P. Pucci.

The Department of Classics provides an interdisciplinary approach to the Greek- and Latin-speaking civilizations of antiquity and to the work of later writers and thinkers who used Latin as their linguistic medium. It also offers, from time to time, courses in other ancient languages of Italy and, every other year, a program in modern Greek.

Historical writers, poets, philosophers, and the great architects and artists of Greco-Roman civilization are the subject matter. The department teaches them primarily for their central importance in a humanistic education.

The department offers courses in Bronze Age and Classical archaeology and sponsors an archaeological dig at Alambra in Cyprus. Here at Cornell it has a fine collection of ancient artifacts, reproductions of ancient sculpture; and one of the few laboratories in the world that concentrates 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. 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 programs 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 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 Classics courses (Greek, Latin, and Classical civilization) should submit an outline of their proposed honors work to the honors committee during the first month of their fifth semester.

Study Abroad

Cornell participates in the intercollegiate Center for Classical Studies in Rome which offers courses in Latin, Greek, ancient history, art, archaeology, and Italian. Cornell is a member institution of the American School of Classical Studies at Athens, whose Summer Program is open to graduate students and qualified undergraduates. The American Academy in Rome, of which Cornell is also a member institution, offers regular and summer programs for qualified graduate students. Detailed information on these programs is available in the Department of Classics Office, 120A Goldwin Smith Hall.

Placement in Latin

Placement of first-year students in Latin courses is determined by an examination given by the Department of Classics during orientation week, or, if necessary, in the second half of the fall term.

Classical Civilization

100 Word Power: Greek and Latin Elements in the English Language Fall. 3 credits.

T R 10:10-11:35. 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.

117 Freshman Seminar in Greek Literature Fall. 3 credits.

M W F 9:05.
Topic to be announced.

[118 Freshman Seminar in Ancient Philosophy

Fall or spring. 3 credits. Not offered 1981-82.
P. T. Mitsis.
An examination of the mythic, tragic, and philosophical views of man presented in Homer, Hesiod, the Pre-Socratics, Aeschylus, Sophocles, Euripides, Plato, Aristotle, Epicurus, and the Stoics.]

119 Freshman Seminar in Greek Literature Fall or spring. 3 credits.

M W F 11:15, both semesters.
Topic to be announced.

120 Freshman Seminar in Latin Literature Fall. 3 credits.

M W F 12:20. J. R. Ginsburg.
Fictions, Ancient and Modern. An examination of Robert Graves' historical novels, *I Claudius* and *Claudius the God*, together with the ancient sources on which these novels are based: Tacitus, *The Annals of Imperial Rome* and Suetonius, *Lives of the Caesars*. Discussion will focus on narrative technique in the works of Tacitus, Suetonius, and Robert Graves and the extent to which any of them, ancient or modern, can be said to reflect the past accurately.

[121 Freshman Seminar in Classical Archaeology Fall or spring. 3 credits. Not offered 1981-82.]

122 Freshman Seminar in Latin Literature: Latin Poetry Fall. 3 credits.

M W F 2:30. D. M. Ranneft.
Topic to be announced.

[150 The Myths of Greek and Rome Fall.

3 credits. Not offered 1981-82.
An introductory course on the myths of Greece and Rome for students interested in acquiring a basic background in Greek and Roman myths and legends as they occur in ancient literature and art. It should serve as a foundation for those interested in pursuing various theories as well as for those seeking to improve their grasp of mythical motifs in later

European and American literature. But the primary purpose will be to acquaint the student with the stories themselves, and, where appropriate, to compare Greek and Roman myths with those of the Celts and other European peoples.]

[200 Mediterranean Archaeology (also Ancient Mediterranean Studies 200 and Near Eastern Studies 280) Fall. 3 credits. No prerequisites. Not offered 1981-82.

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. M. 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 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 1:25. R. J. Burton.
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 1981-82.

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 which facilitated the development of the individual and individual achievement. Topics will include: family life, education, economics, government, material culture, religion, social structure. Political and military history, while not totally disregarded, will not be of primary concern.]

[224 Greek Philosophy Fall. 3 credits. Not offered 1981-82.

An introduction to the pre-Socratic philosophers and Plato.]

[225 Hellenistic and Roman Philosophy Spring. 3 credits. Not offered 1981-82.

An introduction to Aristotle and later Greek and Roman philosophy, including Stoicism and Epicureanism.]

[226 The Genius of Christianity Fall. 3 credits.

T R 2:30-3:45. Not offered 1981-82.
An evocation of the spirit of the Christian religion over the course of its history. Lectures and class discussions will examine four major themes: New Testament, monasticism, the Reformation, and modernism in theology. Authors read will include theologians, apologists, poets, and mystics from all periods.]

236 Greek Mythology (also Comparative Literature 236) Fall. 3 credits.

M W F 2:30. M. L. Cook.

A survey of the Greek myths, with emphasis on 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 with Roman attitudes to myth.

237 Greek and Roman Mystery Religions Spring. 3 credits.

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 1:25. 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 for a new audience.

[245 Greek and Roman Historians Spring.

3 credits. Not offered 1981–82.

J. R. Ginsburg.

Study of historical writing in antiquity through selected readings (in translation) from the Greek and Roman historians. Among the topics to be examined are the historian's task as understood by the ancients; the method, narrative technique, and accuracy of the Greek and Roman historians; their attitudes to the events which they relate.]

[Cicero and His Age (also History 270) Spring.

4 credits. Not offered 1981–82.

An interdisciplinary examination of the final decades of the Roman Republic as seen through the eyes of the period's most prolific writer. Selections from Cicero's speeches, his personal correspondence, and his philosophical, political, and oratorical essays are studied for the light they throw on both the man and his times. (Students who are enrolled in History and Classics 270 and know Latin may read selected texts in the original in an additional section each week. See Classics 319, below.)

300 Greek and Roman Drama (also Comparative Literature 300) Spring. 4 credits.

T R 10:10–11:35. G. M. Kirkwood.

A study of ancient tragedy and comedy as exemplified by representative plays, read in translation, of Aeschylus, Sophocles, Euripides, Aristophanes, Menander, Plautus, Terence, and Seneca. Main emphasis is on Greek tragedy. Consideration also of the development of the 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.

[304 Roman Law Spring. 4 credits. Not offered 1981–82.

While based upon a history of the formal structure of Roman law from the XII Tables to the *Digest*, Classics 304 will deal with Roman law in its wider ramifications; law as a weapon in political strategy; law as it appears in Roman philosophy, rhetoric, education, and literature (comedy and satire); law as a mirror of society (the family, slavery, social classes, position of women).]

[331 Greek Foundations of Western Literature (also Comparative Literature 331) Fall. 4 credits.

Not offered 1981–82.]

[332 Pagans and Christians at Rome (also Comparative Literature 332) Fall. 4 credits. Not offered 1981–82.

A survey of the history of the later Roman empire seen through the religious controversies of that age. Readings from a variety of original sources in translation.]

[333 Latin Foundations of Western Literature (also Comparative Literature 333) Spring.

4 credits. Not offered 1981–82.]

[336 Foundations of Western Thought (also Comparative Literature 336) Spring. 4 credits. Not offered 1981–82.

An introduction to the thought of Socrates and Plato. The reading will consist of selected dialogues of Plato, including most of Plato's early dialogues and the *Republic*.]

[337 Ancient Philosophy of Science Fall.

4 credits. Not offered 1981–82.

The development of scientific method by the ancient Greeks; the pre-Socratic philosophers, Aristotle, the ancient atomists, and the medical writers (Hippocrates, the empiricists, Galen).]

[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 1981–82.

The aim is not only to provide an introduction to comedy, satire, and other humorous writing in Greek and Roman literature, but to discuss the ancient works in the light of modern theories of comedy and laughter. Discussion of the nature of laughter itself in the 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, Nonnus, Plautus, Horace, Martial, Juvenal, and Petronius.]

[363 Women in Classical Greece and Rome Spring. 4 credits. Not offered 1981–82.

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 evidence, basic chronology, and the development of political systems.]

[426 Augustine Fall. 4 credits. Prerequisites:

Classics 428 or permission of instructor. Not offered 1981–82.

M 2:30–4:30.

The life and works of the dominant native genius of western medieval intellectual history. Readings are taken mainly from the works of Augustine in English translation.]

[428 The Church of the Fathers Spring. 4 credits.

Not offered 1981–82.

A rigorous historical survey of the development of doctrines and ecclesiastical institutions in the early church from the second through eighth centuries. Readings from original sources in translation.]

[430 Genre and Period in Greek and Roman Literature (also Comparative Literature 430) 4 credits. Prerequisite: one upper-division course in Classics, comparative literature, English or the modern foreign languages; senior standing or permission of the instructor. Not offered 1981–82.]**[463 Decline and Fall of the Roman Empire** Fall. 4 credits. Limited to 20 students. Not offered 1981–82.

The fall of Rome has transfixed modern scholars with fascination. In the camps of the barbarian invaders, in the cloisters of the new monastic movement, and in the decaying cities of the ancient world they seek

guiding principles to help them understand how great societies can lose their vitality and how new life can spring from the ruins of the dying past. The focus of this course will be on the ideas and events of late antiquity, but attention will be paid throughout to the implications of those events and ideas for modern scholars and modern societies.]

465–466 Independent Study in Classical**Civilization, Undergraduate Level** Fall and spring, respectively. Up to 4 credits.

Hours to be arranged.

[610 Language of Myth Spring. 4 credits. Not offered 1981–82.

An analysis of the theories on language leading to Levi-Strauss and Derrida.]

[681 Patristic Seminar: Graduate Fall or spring. 4 credits. Not offered 1981–82.]**711–712 Independent Study for Graduate****Students in Classical Civilization** Fall and spring, respectively. Up to 4 credits.

Hours to be arranged.

Greek**101 Greek for Beginners** Fall and spring. 4 credits.

M T W F 12:20, both semesters. Fall.

G. M. Kirkwood; spring, staff.

Introduction to Attic Greek. Designed to enable the student to read the ancient authors as soon as possible.

103 Attic Greek Fall and spring. 4 credits.

Prerequisite: Classics 101 or equivalent.

M T W F 12:20, both semesters. Fall, M. L. Cook; spring, staff.

A continuation of Classics 101.

111–112 Modern Greek Fall and spring, respectively. 3 credits.

M W F 9:05, both semesters. G. M. Messing.

201 Attic Authors Fall. 3 credits. Prerequisite: Classics 103 or equivalent.

M W F 1:25. P. T. Mitsis.

Selected readings from Plato, Thucydides, and Euripides.

203 Homer Spring. 3 credits. Prerequisite: Classics 103 or equivalent.

M W F 9:05. G. M. Kirkwood.

Readings in the Homeric epic.

204 Plato Spring. 3 credits. Prerequisite: Classics 103 or equivalent.

M W F 1:25. P. T. Mitsis.

Selected readings from Plato.

209 Greek Composition Fall. 2 credits.

Prerequisite: Classics 103 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, 204, or equivalent.

M W F 10:10. J. E. Coleman.

This year the course will consist of reading (in Greek) and study of selected passages from Herodotus.

302 Greek Tragedy Fall. 4 credits. Prerequisite: Classics 203 or equivalent.

M W F 11:15. G. M. Kirkwood.

305 Attic Comedy Spring. 4 credits. Prerequisite: Classics 203 or 204 or equivalent.

M W F 2:30. P. Pucci.

[306 Greek Melic, Elegiac, and Bucolic Poetry] Spring. 4 credits. Prerequisite: Classics 203, 204, or equivalent. Not offered 1981–82.]

[307 Plato] Fall. 4 credits. Prerequisite: Classics 203 or 204 or equivalent. Not offered 1981–82.]

[308 New Testament Greek] Spring. 4 credits. Prerequisite: two terms of 200-level Greek or permission of instructor. Not offered 1981–82. Readings in New Testament texts discussed in seminar format, with one session a week devoted exclusively to problems with language and translation exercises.]

[310 Greek Undergraduate Seminar] Fall or spring. 4 credits. Prerequisite: two terms of 200-level Greek or permission of instructor. Not offered 1981–82.]

401–402 Independent Study in Greek, Undergraduate Level Fall and spring, respectively. Up to 4 credits.
Hours to be arranged.

417 Advanced Readings in Greek Literature Fall. 4 credits. Intended for advanced undergraduates and graduate students. Prerequisite: two terms of 300-level Greek or permission of instructor.

M W F 12:20. J. E. Coleman.
Homer and the Heroic Age. Extensive readings in the *Iliad* and the *Odyssey*, coupled with a consideration of the archaeological and cultural background of the Homeric poems. Topics of study will include the Mycenaean palaces, Linear B, Troy, the collapse of Mycenaean civilization, Geometric Greece and the introduction of the Phoenician alphabet into Greece.

418 Advanced Readings in Greek Literature Spring. 4 credits. Intended for advanced undergraduates and graduate students. Prerequisite: two terms 300-level Greek or permission of instructor.
M W F 10:10. P. Pucci.
Topic to be announced.

[419 Advanced Greek Composition] Fall. 2 credits. Prerequisite: Classics 209, 210 or equivalent. Not offered 1981–82.]

[442 Greek Philosophy] Fall or spring. 4 credits. Not offered 1981–82.]

671 Seminar in Greek: Graduate Fall. 4 credits.
T 3–5. P. Pucci.
The *Odyssey*.

672 Seminar in Greek: Graduate Spring. 4 credits.
T 3–5. P. T. Mitsis.
Plato.

701–702 Independent Study for Graduate Students in Greek Fall and spring, respectively. Up to 4 credits.
Hours to be arranged.

Latin

105 Latin for Beginners Fall or spring. 4 credits.
Fall: M T W F 8, staff; M T W F 10:10, K. Clinton;
M T W F 1:25, staff. Spring: M T W F 8, P. Kirkwood.
An introductory course in the essentials of the Latin language, designed for rapid progress toward reading the principal Latin writers.

106 Elementary Latin Spring. 4 credits.
Prerequisite: Classics 105 or placement by departmental examination.
M T W F 8, staff; M T W F 10:10, P. Kirkwood; M T W F 1:25, staff.
A continuation of Classics 105, using readings from various authors.

[107 Intensive Latin] Spring. 7 credits. Not offered 1981–82.
M T W R F 8, plus an additional session to be arranged.

The course work of Classics 105 and 106 is combined in one term.]

108 Latin in Review Fall. 3 credits. Prerequisite: placement by departmental examination.
M W F 11:15. R. J. Burton.

205 Intermediate Latin Fall. 3 credits.
Prerequisite: Classics 106 or 107 or 108 or placement by departmental examination.
Sec 1, M W F 10:10; P. Kirkwood. Sec 2, M W F 1:25. J. R. Ginsburg.
Section 1: Selected letters of the younger Pliny, Roman gentleman, man of letters, and friend of the emperor Trajan.
Section 2: Selections from the *Letters* of Cicero.

207 Catullus Spring. 3 credits. Prerequisite: Classics 106 or 107 or 108 or one term of 200-level Latin.
M W F 2:30. G. M. Messing.
Readings from Catullus' 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 107 or 108 or one term of 200-level Latin. Not offered 1981–82.]

216 Vergil Spring. 3 credits. Prerequisite: one term of 200-level Latin.
M W F 11:15. J. R. Ginsburg.
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 107 or 108 or equivalent. Not offered 1981–82.]

[242 Latin Composition] Spring. 2 credits.
Prerequisite: Classics 241 or equivalent. Not offered 1981–82.]

[312 Latin Undergraduate Seminar] Fall or spring. 4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor. Not offered 1981–82.]

[314 The Augustan Age] Fall. 4 credits.
Prerequisite: two terms of 200-level Latin. Not offered 1981–82.]

[315 Roman Satire] Spring. 4 credits. Prerequisite: two terms of 200-level Latin. Not offered 1981–82.]

316 Roman Philosophical Writers Fall. 4 credits.
Prerequisite: two terms of 200-level Latin.
M W F 2:30. P. T. Mitsis.
Selected readings from Lucretius' *De Rerum Natura* and Cicero's *De Finibus*.

317 Roman Historiography Spring. 4 credits.
Prerequisite: one term of 300-level Latin or permission of the instructor.
M W F 1:25. J. R. Ginsburg.
Readings from Livy 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 1981–82.]

[319 Readings in Cicero (also History 319)] Spring. 1 credit. Prerequisite: two terms 200-level Latin; students must also be enrolled in Classics 270 (also History 270). Not offered 1981–82.
Hours to be arranged.
Students who are enrolled in Classics 270 and History 270 and who know Latin may read selected texts in the original in an additional section each week.]

[365 Cicero and His Age] Fall or spring. 4 credits. Prerequisite: two semesters of 200-level Latin or permission of instructor. Not offered 1981–82.]

[366 Late Latin] Spring. 4 credits. Prerequisite: permission of the instructor. Not offered 1981–82. The *Rule* of St. Benedict.]

368 Medieval Latin Literature Fall. 4 credits.
Prerequisite: Classics 214 or permission of the instructor.

T R 2:30–3:45. R. J. Burton.
Medieval Latin texts and their historical and cultural contexts are closely studied. Each term the course will concentrate on two or three topics, such as particular authors, genres, or periods.

[411–412 Advanced Readings in Latin Literature] Fall and spring, respectively. 4 credits. For advanced undergraduates and graduate students. Prerequisite: two terms of 300-level Latin or permission of instructor. Not offered 1981–82.]

[441 Advanced Latin Composition] Spring. 2 credits. For undergraduates who have completed Latin 241–242 and for graduate students. Not offered 1981–82.]

451–452 Independent Study in Latin, Undergraduate Level Fall and spring, respectively. Up to 4 credits.
Hours to be arranged.

[460 The Latin Poems of Milton] Fall. 4 credits. Prerequisite: two semesters of 300-level Latin. Not offered 1981–82.]

679 Seminar in Latin: Graduate (also History of Art 520) Fall. 4 credits.
R 3–5. F. M. Ahl and A. Ramage.
The Empire in Transition. Art, literature, and life in the Roman world from Nero's death to the mid-second century A.D.

680 Seminar in Latin: Graduate Spring. 4 credits.
R 3–5. Staff.
Topic to be announced.

751–752 Independent Study for Graduate Students in Latin Fall and spring, respectively. Up to 4 credits.
Hours to be arranged.

Classical Archaeology

[206 The Rise of Classical Greece] Fall. 3 credits. Not offered 1981–82.
Archaeology of the Greek dark ages. Topics include: site reports, pottery, metalworking, the introduction of the alphabet, the beginnings of coinage, and links with Anatolia and the Near East.]

220 Introduction to Classical Archaeology (also History of Art 220)
M W F 9:05. A. Ramage.

The sculpture, vase painting, and architecture of the ancient Greeks, from the Geometric period through the Hellenistic and the art of the Romans from the early Republic to the late Empire.

221 Minoan-Mycenaean Art and Archaeology (also History of Art 221) Spring. 3 credits.
M W F 10:10. J. E. Coleman.

Greece from the Neolithic period to the end of the Bronze Age, with special emphasis on the Minoan and Mycenaean civilizations and their interactions with the neighboring civilizations of Anatolia and the Near East.

232–233 Archaeology in Action I and II 232, fall; 233, spring. 3 credits each term. Prerequisites: Archaeology 100, Classics 220, or permission of the instructor.
M 2:30–4:25; two labs to be arranged.
P. I. Kuniholm.

Objects from the Classical, Hellenistic, and Roman periods are "dug" out of Cornell basements, identified, cleaned, restored, catalogued, and photographed and are considered in their appropriate historic, artistic, and cultural contexts.

309 Dendrochronology of the Aegean Fall or spring. Up to 4 credits. Limited to 10 students. Prerequisite: permission of the instructor.

M 12:20–2:15; 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 1981–82.]

[321 Archaeology of Cyprus (also History of Art 321)] Spring. 4 credits. Prerequisite: Classics 220 or permission of instructor. Not offered 1981–82.

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]

Spring. 4 credits. Prerequisite: Classics 220, 221, or permission of the instructor. Not offered 1981–82.

A study of the Eastern Mediterranean from the eighth through the fourth centuries B.C. Emphasis on the Phrygians, Lydians, Carians, Lycians, Ionians, and others.]

[323 Painting in the Greek and Roman World (also History of Art 323)] Spring. 4 credits. Not offered 1981–82.]

324 Architecture in the Greek and Roman World (also History of Art 324) Spring. 4 credits.

M W F 2:30. J. E. Coleman.

Technical aspects of the subject will generally be considered only when they are of relevance to historical and aesthetic considerations. Students will be expected to have some background in Classical Antiquity (e.g., completion of Classics 220 or its equivalent).

[325 Greek Vase Painting (also History of Art 325)] Fall. 4 credits. Not offered 1981–82.

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 1981–82.

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 1981–82.

A look at the varied issues of Greek cities and the Roman state. The coins will be considered as art objects as well as economic and historical documents. The changes in design, value, and metals from the origins of coinage to the Late Roman period are studied. Lectures, student presentations, work with actual examples.]

[329 Greek Sculpture (also History of Art 329)]

Fall. 4 credits. Not offered 1981–82.

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 1981–82.

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. Not offered 1981–82.

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.]

[629 Seminar in Classical Archaeology] Fall. 4 credits. Not offered 1981–82.

The seminar will focus on the shaft graves at Mycenae and will examine the evidence from the shaft graves for mainland continuity and for influences from Crete, the Cycladic islands, and abroad.]

[630 Seminar in Classical Greek Archaeology: Graduate] Spring. 4 credits. Not offered 1981–82.]

Classical Linguistics

[420 History of the Greek Language] Fall.

3 credits. Graduate students in Classics will be expected, in addition, to register in Advanced Greek Composition, Greek 419. Not offered 1981–82. Lectures and assigned readings will cover the evolution of Greek from Indo-European and its subsequent development up to the Koine.]

[423 Vulgar Latin (see also Romance Linguistics)]

Spring. 4 credits. Not offered 1981–82.

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 1981–82.]

425 Greek Dialects Fall. 4 credits.

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 readings 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.

Comparative Literature

W. W. Holdheim, chairman; 244 Goldwin Smith Hall, 256–4155. T. Bahti, C. M. Carmichael, W. Cohen, director of undergraduate studies, W. J. Kennedy, M. Spariosu (Mellon Fellow), with J. Culler (English), D. I. Grossvogel (Romance studies), P. Hohendahl (German), E. Rosenberg (English)

Also cooperating: M. H. Abrams, C. Moron-Arroyo, J. P. Bishop, E. A. Blackall, E. G. Fogel, G. Gibian, S. L. Gilman, A. V. Grossvogel, N. Hertz, C. Kaske, R. E. Kaske, G. M. Kirkwood, C. Levy, H. S. McMillin, T. Murray

A broad spectrum of courses in various literary problems (imitation and influence, Marxist aesthetics, literature and history), major authors (Dostoevsky, Ibsen, Dante), key thematics, (the hero, the city, the detective), stylistic modes (satire, parody, allegory), generic forms (drama, novel, short fiction), and historical periods (medieval, Renaissance, modern), are offered by the department. For the student who chooses to major in another literature, courses in comparative literature offer a rich background that supplements their specialization.

The Major

The major is designed to integrate students' knowledge of Western literature, to develop their critical reading abilities, and to train them for careers that demand analytical, interpretive, and evaluative skills. By the beginning of the sophomore year proficiency in at least one foreign language is required. By the end of sophomore year students normally have taken the introductory courses surveying the literature of two or more national traditions (such as German, English, romance studies, Russian, Classics, Near Eastern studies, or Asian studies). Students then select 52 credits of advanced courses in those departments and in comparative literature to form a sequence that combines an education in a wide range of literatures with techniques of analyzing, interpreting, and evaluating literary texts.

Freshman Seminars

Any 100-level course may be used toward satisfying the Freshman Seminar requirement.

100-level courses. See Freshman Seminar brochure.

201–202 Great Books 201, fall; 202, spring. 4 credits. Comparative Literature 201 is not a prerequisite for 202.

Fall: M W F 10:10, W. J. Kennedy. Spring: T R 10:10–11:25, W. Cohen.

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, Virgil, Dante, Shakespeare, and Cervantes. 202: selections from Voltaire, Goethe, Dickinson, Dostoevsky, Ibsen, Pirandello, T. S. Eliot, García Márquez, and others.

236 Greek Mythology (also Classics 236) Fall. 3 credits.

M W F 2:30. M. Cook.

A survey of the Greek myths, with emphasis on 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 with Roman attitudes to myth.

295 Introduction to Semiotics (also English 295) Fall. 4 credits.

M W F 11:15. J. Culler.

Adopting the semiotic perspective, we will study culture as a series of systems of convention or sign systems. Readings will focus on phenomena such as literature, advertising, schizophrenia, fashion, food, and tourism. No previous knowledge assumed.

300 Greek and Roman Drama (also Classics 300) Spring. 4 credits.

T R 10:10–11:25. G. M. Kirkwood.

A study of ancient tragedy and comedy as exemplified by representative plays, read in translation, of Aeschylus, Sophocles, Euripides, Aristophanes, Menander, Plautus, Terence, and Seneca. Main emphasis is on Greek tragedy. Consideration also of the development of the Greek theater (illustrated) and its relationship to the form and presentation of the dramas; the origins of tragedy; the influence of Greek tragedy and Seneca on later European drama.

303 Isms: General Concepts in Modern Cultural History (also Romance Studies 303) Spring. 4 credits.

T R 12:20–1:35. C. M. Arroyo

The possibility of defining terms such as baroque, classicism, et cetera. The meaning of those "unwritten texts" in historiography. An attempt at a definition of Humanism, baroque, classicism, romanticism, realism, positivism, Marxism, symbolism, futurism, existentialism, structuralism.

306 The Film as Cultural, Artistic, and Political Reflector in Postwar Italy (also Italian 399) Fall. 4 credits.

Level: undergraduates or graduates, especially those interested in the arts, government, history, literature.

T R 2:30–3:45. D. Grossvogel, G. Mazzotta.

An examination of the Italian postwar film as a focal point for the survey and analysis of the political, social, and cultural evolution of postwar Italy. Screenings of twelve films will be scheduled. A final, thirteenth film, will be scheduled on the last day of class: the final paper will be based on that film. The reading list will consist of three books, to be read during the first three weeks of the course, and which will be the basis for three quizzes: September 10: Albrecht-Carrie, René: *Italy from Napoleon to Mussolini* (Columbia, 1950); September 17: Willis, F. Roy: *Italy Chooses Europe* (Oxford, 1971); September 24: Barzini, Luigi: *The Italians* (Atheneum, 1977).

[312 Comedy] 4 credits. W. J. Kennedy. Not offered 1981–82.]**[326 Christianity and Judaism]** 4 credits. C. M. Carmichael. Not offered 1981–82.]**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 Fall. 4 credits.

M W F 12:20. R. E. Kaske.

Analysis and interpretation of great medieval literary works in translation. Though readings will vary somewhat from year to year a typical program would be *Beowulf*; *Nibelungenlied*; *Njáls saga*; a romance of Chrétien; Wolfram's *Parzival*; Gottfried's *Tristan* and/or *Sir Gawain and the Green Knight*.

344 Medieval Literature (also Italian 334) Spring. 4 credits.

M W F 12:20. G. Mazzotta.

Dante in translation.

352 Classic and Renaissance Drama (also Theatre Arts 325) Fall. 4 credits.

T R 12:20–1:35. W. Cohen.

Comparative drama from the Greeks to the mid-seventeenth century. Emphasis on relations

among history, ideology, theater, and dramatic form, approached primarily from a Marxian perspective. Readings in Aeschylus, Sophocles, Aristophanes, Plautus, medieval drama, Shakespeare, Lope de Vega, Calderón, Corneille, and others.

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 Molière to Ibsen, including such authors as Racine, Congreve, Sheridan, Schiller, Goethe, Hugo, Büchner, Gogol, Turgenyev, Zola, Hauptmann, and Chekhov.

354 Modern Drama (also Theatre Arts 327) Fall. 4 credits.

M W F 1:25. A. Caputi.

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, Genêt, and others.

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 and J. Najemy, with W. Kennedy, G. Mazzotta, and 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, and C. Kaske, with C. Arroyo, C. Holmes, P. Lewis, J. Najemy, and J. Richards.

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, Montaigne, Edmund Spenser, Bodin, Cervantes, and Galileo. Close reading of texts, literary and visual; discussion will include methods of interpretation and historical analysis.

363–364 The European Novel Fall and spring.

4 credits. Comparative Literature 363 is not a prerequisite for 364.

Fall: T R 10:10–11:25. J. Golden, L. Pasto-Crosby. Spring: T R 10:10–11:25. E. Rosenberg.

Close reading of approximately eight works each term. 363: From Cervantes to Dostoevsky. 364: From Tolstoy to Gide. Authors to be read will include Sterne, Voltaire, Balzac, Flaubert, Hardy, and Mann. The works discussed will illustrate novelistic subgenres such as the picaresque novel, the novel of manners, the philosophical tale, the historical novel, the detective story, and the Bildungsroman.

379 The Russian Connection (also Russian 379) Spring. 4 credits. Conducted in English.

M W F 10:10. P. Carden.

Russian literature in its European context. We will discuss great works of the Russian prose tradition in their reciprocal relations with European prose. Among the Russian works to be studied will be short stories by Pushkin, Gogol, Turgenyev, and Chekhov, and Tolstoy's *War and Peace* and Dostoevsky's *The Idiot*. Among European authors whose work helped to shape or was in some degree shaped by Russian literature, we will look at Sterne (*Tristram Shandy*), Hoffman, Sand, Stendhal (*The Charterhouse of Parma*) and Maupassant. Readings in English translation.

381 Marxist Cultural Theory Spring. 4 credits.

T R 2:30–3:45. W. Cohen and 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, Trotsky, Lukács, Gramsci, Brecht, Benjamin, Horkheimer, Adorno, Marcuse, Sartre, Althusser, and Williams.

389 Modern Literature in Poland, Czechoslovakia, and Yugoslavia (also Russian Literature 389) Spring. 4 credits.

T R 2:30–4:30. G. Gibian.

The course will focus on novels and short stories, but some consideration will also be given to drama and poetry. No knowledge of Eastern European languages is required; the reading will be done in English translation. Primary emphasis will be on the texts as literary works of art, but attention will also be given to historical and political backgrounds. Wherever possible, Eastern European films relating to work in the course will be shown.

396 New German Cinema and the Question of the Text Spring. 4 credits.

T R 12:20–1:35; some evening screenings and class meetings. T. Bahti.

A course in understanding the "new German cinema" in its contexts: cinematic, literary, intellectual, cultural, and social. Studying three films by Herzog, four by Wenders, and one by Fassbinder, the course will focus on the question of cinema in relation to various received texts: medieval legend, romantic discourse, early German film (Murnau), American film (Hitchcock) and rock-and-roll, and contemporary media.

399 The Divided Self in Women's Writing Fall. 4 credits.

T R 10:10–11:25. I. Ezergailis.

A thematic and structural investigation of women's writing to explore the tension between the highly developed self-awareness of narrator and/or heroine or both and the desire for wholeness. We will trace some of the ways in which women writers have tried to resolve or transcend this problem of identity by retreat, acceptance, or new synthesis. The list of authors includes Virginia Woolf, Doris Lessing, and Sylvia Plath as well as translations of contemporary German women novelists.

400 The Japanese Noh Theatre and Modern Dramatists (also Asian Studies 400) Spring. 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 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 Fall. 4 credits.

R 2:30–4:30. W. Cohen.

A survey of European literary theory since Plato. 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 Plato, Aristotle, Horace, Boccaccio, Castelvetro, Sidney, Corneille, Johnson, Kant, Hegel, Marx, Tolstoy, Barthes, and others.

405 Metaphor, Modernism, and Cultural Context: The Use of Metaphor in Modernist Hebrew, Yiddish, English, and American Poetry (also Near Eastern Studies 405) Spring. 4 credits.

Prerequisite: a 200-level or higher course in one of the following: Hebrew or Yiddish language or literature, English or comparative literature.

R 2-4:25. C. Kronfeld.
This course investigates the issue of the typical modernist metaphor against the background of interdisciplinary theories of metaphor. Examples are taken from three different literatures and branches of modernism: Hebrew anti-formulaic poetry, the Yiddish introspectivists, English and American imagists, et cetera. Readings will include Fogel, Amichai, Glatstein, Sutzkever, Eliot, Stevens, Williams, and others. Discussions and readings in English; students will have the option of reading these texts in Hebrew or Yiddish.

414 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, Maupassant. The theory of the novella and the genre's relation to other short narrative forms will be discussed.

415 The Later Eighteenth Century Fall. 4 credits. Prerequisite: reading knowledge of French.

T R 10:10-11:25. N. Hertz.
Readings of French and English works in various genres (poetry, fiction, speculative prose) chosen to illustrate two characteristic Enlightenment concerns—the relations of the sexes and the nature of aesthetic experience. Texts: Burke, *Of The Sublime and Beautiful*; Rousseau, *Lettre sur les Spectacles*; Richardson, *Clarissa*; Laclos, *Les Liaisons Dangereuses*; Sade, *Justine*; Wordsworth, *The Ruined Cottage*.

419-420 Independent Study Fall and spring. Variable credit. Comparative Literature 419 is not a prerequisite for 420.

Hours to be arranged. Staff.

421 Old Testament Seminar Fall. 4 credits. Limited to 20 students.

T 2:30-4:25. C. M. Carmichael.
Identification and discussion of problems in the Old Testament.

[426 New Testament Seminar 4 credits. C. M. Carmichael. Not offered 1981-82.]

429 Readings in the New Testament Fall. 4 credits. No prerequisites.

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 1981 will be on Paul and Acts. 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.

458 Petrarch, Ronsard, and Donne Fall. 4 credits. M 2:30-4:30. W. J. Kennedy.

A close study of the poetry of Petrarch; of his Renaissance emulator, Ronsard; and of the baroque poet who reshaped Petrarchan forms, Donne.

461 Readings in Romanticism (also English 440) Fall. 4 credits.

T R 12:20-1:35. C. Chase.
Readings in poetry and prose by Wordsworth, Rousseau, Shelley, Keats, and Baudelaire. Focusing on how these works engage and dispute with each other, the seminar will consider questions they raise about understanding, memory, and the nature of language. Readings available in English.

488 Fiction and Its Doubles Fall. 4 credits. M W F 1:25. M. Spariosu.

The course will examine not only the various aspects and uses of the theme of the double in fiction but also the relationship between authors and their fictional doubles. Discussions will be based on short works by Chamisso, Hoffmann, Gogol, Balzac, Dostoevsky, Wilde, Borges, Unamuno, Nabokov, Cortazar, and Lowry.

494 Seminar in Literary Theory: Rezeptionsästhetik Spring. 4 credits.

M 3:35-5:30. P. Hohendahl.
The interest in the reception of literature and reader response has become a major focus for the development of literary theory since 1970. The seminar will concentrate on the emergence of Rezeptionsästhetik in both West and East Germany during the late sixties and early seventies. The reading material will be taken from the writings of Jauss, Iser, Naumann, and Weimann. Similar movements in other countries will be included.

604 Six Critics in Search of an Author: Sartre, Criticism, Critics (also French 694) Spring. 4 credits.

M 2-4. D. Grossvogel.
This seminar proposes to review Sartre's main contributions to literature (fiction, theater, criticism) and to examine some of the criticism which this magnum opus has engendered and influenced. The critics would be Blanchot, Girard, Jameson, Marcuse, Mehlman, Ricardou.

607 Lacan (also French 683) Fall. 4 credits. M 2:30-4:25. R. Klein.

The work of Jacques Lacan has dominated French intellectual life for most of the last decade. The study of his contribution to the spread of psychoanalytic theory, his effect on the therapeutic practice of psychiatry, and his role in expanding the horizons of many associated disciplines will be subordinated in this course to the question of his direct influence on literary critical theory and on the theory of interpretation. Some attempt will be made to measure the stakes of the various polemics at whose center he has regularly been found. The difficulty of his style requires that the student have some familiarity with French, although only texts already translated into English will be assigned.

619-620 Independent Study Fall and spring. Variable credit. Comparative Literature 619 is not a prerequisite for 620.

Hours to be arranged. Staff.

633 Problems in Romanticism: Hölderlin Spring. 4 credits. Prerequisite: reading knowledge of German. Qualified undergraduates admitted with the permission of the instructor.

M 1:25-3:25. T. Bahti.
A seminar in close interpretation of the work of Germany's major romantic poet. Emphasis will be on the late "hymns," but attention will also be given to the earlier lyrics, *Hyperion*, the theoretical writings, the *Empedokles* project, and the late translations of Sophocles and Pindar. The works will be read in the contexts of German idealist philosophy and European romanticism.

661 Deconstruction and Literary Criticism Fall. 4 credits.

W 2:30-4:30. J. Culler.
Study of selected works by Jacques Derrida, followed by consideration of the implications of deconstruction for literary studies and its role in American deconstructive criticism. Considerable attention will be given to literary examples, including *Les Fleurs du Mal*, *Walden*, and *Billy Budd*.

694 Mimesis and Anti-Mimesis in Modern Literary Theory Spring. 4 credits.

T 2:30-4:30. M. Spariosu.
This course will examine the concept of mimesis as it appears in modern criticism whether under the

structuralist or formalist, Marxist or Freudian guise. Readings will include selections from Shklovsky, Freud, Benjamin, Auerbach, Goldmann, Barthes, Girard, Derrida, et. al.

698 Literature and History Fall. 4 credits.

Prerequisite for undergraduates: permission of instructor.

T 1:25-3:25. W. W. Holdheim.
Close reading of selected texts illustrating the following trends and concerns in the modern history of ideas: the triumph of philology (Spitzer, Auerbach); formalism and its sequel (Tynjanov, Mukarovsky, Barthes); the problem of language and aesthetics (Kracauer, Lévi-Strauss, Hayden White, Gadamer, Jolles). The analysis will always revolve around the interrelationship of historiography and literature, and also deal with the question of the aesthetic nature of historical knowledge itself. The course is open to qualified undergraduates after consultation with the instructor.

Courses Cross-Listed in Comparative Literature

335 The New Latin American Narrative in Translation (also Spanish 335) Fall. 4 credits.

T R 12:20-1:35. F. J. Tittler.

396 Modern Latin American Poetry in Translation (also Spanish 396) Fall. 4 credits.

M W 2:30-3:45. E. Santi.

457 Readings from Don Quixote's Library (also Spanish 457) Fall. 4 credits.

M W F 11:15. M. Randel.

666 Moralities and Fiction: The Classical Moment (also French 666) Spring. 4 credits.

T 2-4:25. P. Lewis.

Related Courses in Other Departments

Many of these courses are conducted in English, and readings are in translation.

Themes from Russian Culture (Russian 307) Fall.

Themes from Russian Culture (Russian 308) Spring.

Russian Theatre and Drama (Russian 332) Fall.

The Russian Short Story (Russian 334) Spring.

The Russian Novel (In English Translation) (Russian 367) Fall.

Soviet Literature (In English Translation) (Russian 368) Spring.

Dostoevsky (In English Translation) (Russian 369) Spring.

Chinese Philosophical Literature (Asian Studies 371)

[Twentieth-Century Chinese Literature (Asian Studies 373)] Not offered 1981-82.]

Japanese Poetry and Drama (Asian Studies 375)

Modern Japanese Fiction (Asian Studies 376)

Southeast Asian Literature in Translation (Asian Studies 379)

Computer Science

R. W. Conway, director of undergraduate studies; 408 Upson Hall, 256-4052.

For complete descriptions, see the computer science listing in the College of Engineering section.

100 Introduction to Computer Programming Fall or spring. 4 credits. S-U grades optional. Students who contemplate taking both Computer Science 101 and 100 must take 101 first.
2 lecs; 1 rec (optional). 3 evening exams.

101 The Computer Age Spring. 3 credits. S-U grades optional. Credit will not be granted for both Computer Science 100 and 101 unless 101 is taken first.
2 lecs; 1 rec.

102 Introduction to FORTRAN Programming Fall or spring (weeks 1–5 only). 1 credit. S-U grades optional. Credit will not be granted for both Computer Science 100 and 102 unless 102 is taken first.

103 Introduction to PASCAL Fall or spring (weeks 2–5 only). 1 credit. S-U grades optional. Prerequisite: Computer Science 100 or equivalent programming experience.

104 Introduction to APL Programming Fall or spring (weeks 6–9 only). 1 credit. S-U grades optional. Prerequisite: Computer Science 100 or equivalent programming experience.

107 Introduction to Interactive Computing with CMS Fall or spring (weeks 2–5 only). 1 credit. S-U grades only. Prerequisite: Computer Science 100 or equivalent programming experience.

108 Introduction to Statistical Packages Fall or spring (weeks 10–13 only). 1 credit. S-U grades only.

109 Multistep Job Processing and JCL Fall or spring (weeks 6–9 only). 1 credit. S-U grades only. Prerequisite: Computer Science 100 or equivalent programming experience.

211 Computers and Programming Fall or spring. 3 credits. Prerequisite: Computer Science 100 or equivalent programming experience.
2 lecs; 1 rec.

280 Discrete Structures Fall. 4 credits. Prerequisite: Computer Science 211 or permission of the instructor.
3 lecs.

305 Social Issues in Computing Fall. 3 credits. Prerequisites: Computer Science 100 or 101 or permission of instructor. Not offered 1981–82.
2 lec-seminars.

314 Introduction to Computer Systems and Organization Fall or spring. 4 credits. Prerequisite: Computer Science 211 or equivalent.
2 lecs; 1 lab.

321 Numerical Methods Fall or spring. 4 credits. Prerequisites: Mathematics 221 or 293; and knowledge of FORTRAN equivalent to what is taught in Computer Science 100.
3 lecs.

410 Data Structures Fall. 4 credits. Prerequisite or corequisite: Computer Science 314.
3 lecs.

414 Systems Programming and Operating Systems Spring. 4 credits. Prerequisite: Computer Science 314 or permission of instructor.
3 lecs.

418 Interactive Computer Graphics (also Architecture 334) Spring. 4 credits. Prerequisite: Computer Science 314.
2 lecs; 1 lab.

432 Introduction to Simulation and Data-Base Systems (also Engineering OR&IE 383) Spring. 4 credits. Prerequisite: Computer Science 211.
2 lecs; 1 rec.

481–482 Introduction to Theory of Computing I and II 481, fall; 482, spring. 4 credits each term. Prerequisites: Computer Science 211 and 280 or equivalent course work in mathematics, or permission of instructor.
3 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.

611 Advanced Programming Languages Fall. 4 credits. Prerequisite: Computer Science 410 or equivalent.
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 Fall. 4 credits. Prerequisites: Computer Science 600 and 414 or permission of instructor.
3 lecs.

[615 Machine Organization Spring. 4 credits. Prerequisite: Computer Science 314 or permission of instructor. 3 lecs. Not offered 1981–82.]

[618 Picture Processing Spring. 4 credits. Prerequisite: Computer Science 611 or permission of instructor. 3 lecs. Not offered 1981–82.]

621–622 Numerical Analysis 621, fall; 622, spring. 4 credits each term. Prerequisites: A course in mathematics beyond freshman-sophomore calculus, such as Mathematics 411, 421, or 431, and a working knowledge of FORTRAN.
3 lecs.

623 Short Course on Linear and Nonlinear Least Squares Fall (weeks 1–6). 2 credits. Prerequisite: knowledge of Computer Science 321 or permission of instructor.

624 Short Course on Spline Approximation Fall (weeks 7–12). 2 credits. Prerequisite: knowledge of Computer Science 321 or permission of instructor.

632 Analysis Data-Base Systems Fall. 4 credits. Prerequisites: Computer Science 410 and either 432 or permission of instructor.
2 lecs.

635 Information Organization and Retrieval Spring. 4 credits. Prerequisite: Computer Science 410 or equivalent.
2 lecs.

681 Theory of Algorithms and Computing I Fall. 4 credits. Prerequisites: Computer Science 481 or permission of instructor.
3 lecs.

682 Theory of Algorithms and Computing II Spring. 4 credits. Prerequisite: Computer Science 681 or permission of instructor.
3 lecs.

709 Computer Science Graduate Seminar Fall or spring. 1 credit each semester. Intended for graduate students interested in computer science.
1 sem.

711 Theory of Programming Languages Spring. 4 credits. Prerequisites: Computer Science 611 and 481. Not offered every year.
2 lecs.

712 Theoretical Aspects of Compiler Construction Spring. 4 credits. Prerequisites: Computer Science 612 and 481. Not offered every year.
2 lecs.

713 Seminar in Operating Systems Fall or spring. 4 credits. Prerequisite: Computer Science 613 or permission of instructor.
1 sem.

719 Seminar in Programming Fall or spring. 4 credits. Prerequisite: Computer Science 611 or permission of instructor.
1 sem.

721 Advanced Numerical Analysis Fall. 4 credits. Prerequisite: Computer Science 621 or 622 or permission of instructor.

722 Advanced Numerical Analysis Spring. 4 credits. Alternates with Computer Science 721. See 721 description.

729 Seminar in Numerical Analysis Fall or spring. 4 credits. Prerequisite: permission of instructor.

[733 Selected Topics in Information Processing (also Engineering OR&IE 789) Not offered 1981–82.]

734 Seminar in File Processing Fall. Credits and hours to be arranged. Prerequisite: Computer Science 733.

739 Seminar in Information Organization and Retrieval Fall or spring. 4 credits. Prerequisite: Computer Science 635.

781 Advanced Theory of Computing Fall. 4 credits. Prerequisites: Computer Science 681 and 682 or permission of instructor. Alternates with Computer Science 782. Not offered every year.

782 Advanced Theory of Computing Spring. 4 credits. Alternates with Computer Science 781. Not offered every year.

789 Seminar in Automata Theory Fall or spring. 4 credits. Prerequisite: permission of instructor.
1 sem.

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.

990 Special Investigations in Computer Science Fall or spring. Prerequisite: permission of a computer science adviser.

Dutch

See Modern Languages, Literatures, and Linguistics, p. 140.

Economics

M. Majumdar, chairman; N. Kiefer, director of undergraduate studies, 480 Uris Hall, 256-6315. K. Burdett, M. G. Clark, T. E. Davis, D. Easley, L. Ebrill, R. Ehrenberg, G. Fields, R. H. Frank, M. Gentler, W. Greene, E. Grinols, G. Hay, W. Isard, R. Joyeux, A. E. Kahn, P. D. McClelland, S. Marston, R. Masson, T. Mitra, U. M. Possen, R. E. Schuler, G. J. Staller, J. Sveinar, E. Thorbecke, S. C. Tsiang, J. Vanek, H. Y. Wan, Jr., M. Yano

The study of economics provides an understanding of the way economies operate and insight into public issues. The department offers a broad range of undergraduate courses in such fields as money and banking; international and comparative economics; 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 its equivalent with an average of C or better. Prospective majors should consult the Director of Undergraduate Studies.

The requirements for a major are (1) Economics 311 and 312; (2) 20 credits of other economics courses listed by the Department of Economics except that, with the permission of the major adviser, one or two economics courses outside the College of Arts and Sciences may be used toward the fulfillment of this requirement; and (3) three courses above the introductory level in subjects related to economics selected, with the approval of the major adviser, from the offerings of the Departments of Anthropology, Asian Studies, Government, History, Mathematics, Philosophy, Psychology, and Sociology. In addition to the courses required for the major, many students will find it valuable to take statistics (the diverse possibilities include Agricultural Economics 310, Engineering OR&IE 270 or 260 and 370, and Mathematics 370 and 371, 472, or 475). Mathematics courses are not required for an undergraduate major. However, students planning graduate work in economics and strongly advised to take mathematics at least through calculus and linear algebra.

Honors. Candidates for the degree of Bachelor of Arts with Honors are required to (1) have a grade point average in economics courses of A- or better, except in unusual circumstances, and (2) enroll in Economics 391 and 392 in their senior year.

101 Introductory Economics Fall or spring. 3 credits.

Lecs and disc. Staff.
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.

102 Introductory Economics Fall or spring. 3 credits.

Lecs and disc. Staff.
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.

General Courses

301 Economics of Market Failure Spring. 4 credits. Prerequisite: Economics 102.

Staff.
The course will review briefly the welfare properties of the perfectly competitive market model and will then consider a range of situations in which these properties are modified and where there may be a case for some form of government intervention. The

cases to be considered will include (a) the presence of externalities, pollution, and the economics of the environment; (b) the provision of public goods, the free-rider problem; (c) uncertainty and imperfect information, an analysis in the context of labor and insurance markets, and the market for medical care; (d) the regulation of natural monopoly and public utility pricing; (e) the failure of the market to achieve desired redistributive objectives, 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.

S. Del Sesto.
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 permission of instructor.

G. Hay.

306 Economics of Defense Spending Spring. 4 credits. Prerequisite: Economics 102.

J. Reppy, with guest lectures by visitors to the Cornell Peace Studies Program.
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.

308 Economic Analysis of Government (also Engineering CEE B302) Spring. 4 credits. Prerequisites: one year of college-level mathematics plus Engineering CEE B301 or Economics 311.

Staff.
Government intervention in a market economy is analyzed. Public goods, public finance, cost-benefit analysis, environment regulation, and macroeconomic topics are covered.

[309 Capitalism and Socialism (also I&LR 347) Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1981-82.]

311 Intermediate Microeconomic Theory Fall or spring. 4 credits. Prerequisites: Economics 101-102 or permission of instructor. Economics 311.5 has a more mathematical approach and is designed to accommodate students in engineering.

Staff.
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 or spring. 4 credits. Prerequisites: Economics 101-102 or permission of instructor.

Staff.
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.

[315 History of Economic Thought Fall. 4 credits. Prerequisites: Economics 101-102 or permission of instructor. Not offered 1981-82.]

317 Intermediate Mathematical Economics I Fall. 4 credits.

Staff.

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.

Staff.
Advanced techniques of optimization and application to economic theory.

319 Quantitative Methods Fall. 4 credits.

R. Joyeux.

320 Quantitative Methods Spring. 4 credits. Prerequisites: thorough understanding of microeconomic and macroeconomic theory and some elementary calculus.

R. Joyeux.
The use of quantitative analysis in economics is introduced. Topics include index numbers, input-output analysis, elementary decision theory, and an introduction to hypothesis testing and the formulation and estimation of econometric models.

Economic History

[321 Economic History of Ancient Medieval Europe 4 credits. Prerequisite: permission of instructor. Not offered 1981-82.]

[322 Economic History of Modern Europe: 1750 to the Present Fall. 4 credits. Open to upperclass students with some background in economics or history, or with permission of instructor. M. R. Haines. Not offered 1981-82.]

323 American Economic History Fall. 4 credits. Prerequisites: Economics 101-102, or permission of instructor.

P. D. McClelland.
Problems in American economic history from the first settlements to early industrialization are surveyed.

324 American Economic History Fall. 4 credits. Prerequisites: Economics 101-102, or permission of instructor.

P. D. McClelland.

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.

T. Davis.

326 History of American Business Enterprise Spring. 4 credits. Prerequisites: Economics 101-102 or equivalents.

P. D. McClelland.
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.

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.

G. Staller, M. Rush, and G. Gibian.
Interdisciplinary survey of the USSR since the Revolution, with emphasis on contemporary developments.

Money, Banking, and Public Finance

331 Money and Credit Spring. 4 credits. Prerequisites: Economics 101-102.

U. M. Possen.

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 311–312.

T. Davis.

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.

E. Grinols.

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.

E. Grinols.

A continuation of Public Finance 335 covering noninstitutional topics. Subjects covered include cost-benefit analysis, choice of public discount rate, optimal commodity taxation, local public goods, collective choice, and other topics depending on the interests of the instructor and the class.

338 Macroeconomic Policy Fall. 4 credits. Prerequisite: Economics 312.

Staff.

The use of fiscal and monetary policies for achieving full employment, price-level stability, and appropriate economic growth are studied.

Labor Economics

[341 Labor Economics] Fall. 4 credits. Prerequisites: Economics 101–102. Not offered 1981–82.]

[342 Problems in Labor Economics (also I&LR 343)] Fall. 4 credits. Prerequisites: Economics 311 or I&LR 240. Not offered 1981–82.

R. Ehrenberg.

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.]

Organization, Performance, and Control of Industry

351 Industrial Organization Fall. 4 credits. Prerequisites: Economics 101–102. Recommended: Economics 312.

G. Hay.

An examination of the basic factors that lead to less competitive markets in the United States economy, and of the factors that may countervail these factors. Both theoretical and empirical generalizations are emphasized, rather than studies of specific industries. The first third of the course is abstract theoretical modeling of competition, oligopoly, and monopoly markets, followed by an examination of the relationship between market structure (e.g., number of firms and markets shares) and its conduct and performance.

352 Public Regulation of Business Spring. 4 credits. Prerequisite: Economics 351 or permission of the instructor.

R. Masson.

Questions of public policy concerning patents and antitrust are surveyed. Incentives of firms under

current law are considered. These questions, along with theories of social costs, are used to examine how patent laws, antitrust laws, or endoresement policies could best be designed. Some past cases that have shaped the current interpretation of the laws are considered.

354 Economics of Regulation Spring. 4 credits.

355 Economics of the American System of Private Enterprise Fall. 4 credits. Prerequisites: Economics 101–102 and Economics 311–312, or equivalents.

R. Frank.

A critical examination of the private sector of the United States economy: its history, some leading current issues involving it, and its relation to theoretical and philosophical interpretations of the market economy.

356 Economics of the American System of Private Enterprise Spring. 4 credits. Prerequisites: Economics 101–102 and Economics 311–312, or equivalents.

R. Frank.

For course description, see Economics 355, above.

357 Economics of Imperfect Information Fall. 4 credits. Prerequisites: Economics 101–102 and calculus.

K. Burdett.

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. 4 credits. Prerequisites: Economics 101–102.

A. Kahn.

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.

International and Comparative Economics

361 International Trade Theory and Policy Fall. 4 credits. Prerequisites: Economics 101–102 or permission of instructor.

A. Ray.

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.

L. Ebrill.

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.

[364 The United States in the World Economy] Spring. 4 credits. Prerequisites: Economics 101–102 or permission of instructor. Not offered 1981–82.]

[365 Economic Policy and Development in Southeast Asia] Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1981–82.]

[366 Introduction to the Japanese Economy] Spring. 4 credits. Not offered 1981–82.]

367 Comparative Economic Systems: Soviet Union and Europe Fall. 4 credits. Prerequisite: Economics 311–312 or permission of instructor.

G. J. Staller.

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.

G. Staller.

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.

371 Public Policy and Economic Development Fall. 4 credits.

Staff.

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. Staff. Not offered 1981–82.]

[373 International Specialization and Economic Development] Spring. 4 credits. Prerequisites: Economics 101–102 or permission of the instructor. Not offered 1981–82.

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.

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.

378 Economics, Population, and Development Fall. 4 credits.

Staff.

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 Worker's Management Fall. 4 credits. Prerequisites: 311–312.

Staff.
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 311–312 or permission of the instructor.

J. Vanek.
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.

Related Course in Another Department

Comparative Economic Systems: Soviet Russia (I&LR 34)

Honors Program

391 Honors Seminar Fall. 4 credits. Required of all senior honors candidates.

S. Marston.
Selected readings in the economics of public issues.

392 Honors Seminar Spring. 4 credits. Required of all senior honors candidates.

S. Marston.
A continuation of Economics 391.

399 Readings in Economics Fall or spring. Variable credit.
Department Faculty.

Graduate Courses and Seminars

503 Nonparametric Methods for Peace Scientists and Regional Scientists Fall. 4 credits.

W. Isard.
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 non-normal distributions.

[504 Economics and the Law Fall. 4 credits. Not offered 1981–82.
Staff.
See Economics 304 for course description.]

505 Interdependent Decision Making Fall. 4 credits.

W. Isard.
The basic elements in interdependent decision-making situations are examined. Situations where decision makers have different sets of objectives which 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 for 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.

T. Mitra.
Topics in consumer and producer theory.

510 Microeconomic Theory II Spring. 4 credits.

D. Easley.
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.

U. Possen.

514 Macroeconomic Theory: Dynamic Models, Growth, and Inflation Spring. 4 credits.

M. Gertler.

517 Intermediate Mathematical Economics I Fall. 4 credits.

D. Easley.

518 Intermediate Mathematical Economics II Spring. 4 credits.

Staff.
See Economics 318 for course description.

519 Quantitative Methods Spring. 4 credits.

R. Joyeux.

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.

Staff.
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.

[521 Economic History of Ancient Medieval Europe Fall. 4 credits. Not offered 1981–82.]

[522 Economic History of Modern Europe: 1750 to the Present Fall. 4 credits. M. R. Haines. Not offered 1981–82.]

523 American Economic History Fall. 4 credits.

P. D. McClelland.
See Economics 323 for course description.

524 American Economic History Spring. 4 credits.

P. D. McClelland.
See Economics 324 for course description.

525 Economic History of Latin America Fall. 4 credits.

T. E. Davis.
See Economics 325 for course description.

[536 Collective Choice: Theory and Applications Spring. 4 credits. Not offered 1981–82.]

551 Industrial Organization Fall. 4 credits.

G. Hay.
See Economics 351 for course description.

552 Public Regulation of Business Spring. 4 credits.

R. Masson.
See Economics 352 for course description.

555 Economics of the American System of Private Enterprise Fall. 4 credits. Prerequisites: Economics 101–102 and Economics 311–312 or equivalents.
R. Frank.
See Economics 355 for course description.

556 Economics of the American System of Private Enterprise Spring. 4 credits. Prerequisites: Economics 101–102 and Economics 311–312 or equivalents.

R. Frank.
See Economics 356 for course description.

557 Economics of Imperfect Information Fall. 4 credits. Prerequisites: Economics 101–102 and calculus.

K. Burdett.
See Economics 357 for course description.

561 International Trade Theory and Policy Fall. 4 credits. Prerequisites: Economics 101–102 or permission of instructor.

A. Ray.
See Economics 361 for course description.

562 International Monetary Theory and Policy Spring. 4 credits. Prerequisites: Economics 101–102 or permission of instructor.

L. Ebrill.
See Economics 362 for course description.

565 Economic Problems of Latin America Spring. 4 credits.

T. E. Davis.

[566 Introduction to the Japanese Economy Spring. 4 credits. Not offered 1981–82.]

567 Comparative Economic Systems: Soviet Union and Europe Fall. 4 credits.

G. J. Staller.
See Economics 367 for course description.

568 Comparative Economics: United States, Europe, and Soviet Union Spring. 4 credits. Prerequisites: Economics 101–102.

G. Staller.
See Economics 368 for course description.

571 Public Policy and Economic Development Fall. 4 credits.

Staff.
See Economics 371 for course description.

[572 Applied Economic Development Spring. 4 credits. Not offered 1981–82.]

[573 International Specialization and Economic Development Spring. 4 credits. Prerequisites: Economics 101–102 or permission of the instructor. Not offered 1981–82.
See Economics 373 for course description.]

578 Economics, Population, and Development Fall. 4 credits.

Staff.
See Economics 378 for course description.

581 Economics of Workers' Management in Yugoslavia Fall. 4 credits. Prerequisites: Economics 311–312, or permission of instructor.

Staff.
See Economics 381 for course description.

582 The Practice and Implementation of Self-Management Fall. 4 credits.

J. Vanek.
See Economics 382 for description.

599 Readings in Economics Fall or spring. Variable credit.
Department faculty.

603 Seminar in Peace Science Fall. 4 credits.

W. Isard.

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.

W. Isard.

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.

[611 Advanced Microeconomic Theory Spring. 4 credits. H. Wan. Not offered 1981-82.]**[612 Advanced Macroeconomic Theory** Fall. 4 credits. S. Marston. Not offered 1981-82.]**617 Mathematical Economics** Fall. 4 credits. Staff.**618 Mathematical Economics** Spring. 4 credits. D. Easley.**619 Econometrics** Fall. 4 credits. Prerequisites: calculus and linear algebra. Recommended: Economics 520 or equivalent.

R. Joyeux.

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.

N. Kiefer.

Advanced topics in econometrics, such as asymptotic distribution theory, errors in variable and latent variable models (e.g. factor analysis), simultaneous equation models with particular attention to problems of identification, time series analysis, qualitative response models, and aggregation.

[623 American Economic History Fall. 4 credits. Not offered 1981-82.]**[624 American Economic History** Spring. 4 credits. Not offered 1981-82.]**[626 Methods in Economic History** Spring. 4 credits. Not offered 1981-82.]**631 Monetary Theory and Policy** Fall. 4 credits. Staff.**632 Monetary Theory and Policy** Spring. 4 credits. Staff.**635 Public Finance: Resource Allocation and Fiscal Policy** Fall. 4 credits. L. Ebrill.**636 Public Finance: Resource Allocation and Fiscal Policy** Spring. 4 credits. L. Ebrill.**[638 Public Finance: Local Government and Urban Structure** Fall. 4 credits. R. E. Schuler. Not offered 1981-82.]**641 Seminar in Labor Economics** Fall. 4 credits. R. Ehrenberg.**642 Seminar in Labor Economics** Spring. 4 credits. R. Butler.**[644 The Labor Market and Public Policy: A Comparative View** Spring. 4 credits. Not offered 1981-82.]**647 Economics of Evaluation (also I&LR 647)** Spring. 4 credits. R. Ehrenberg. See I&LR 647 for course description.**[648 Issues in Latin America** Spring. 4 credits. Not offered 1981-82.]**651 Industrial Organization and Regulation** Fall. 4 credits. R. Masson.**652 Industrial Organization and Regulation** Spring. 4 credits. R. Masson.**661 International Economics: Pure Theory and Policy** Fall. 4 credits. Staff.**662 Seminar in International Economics** Spring. 4 credits. Prerequisites: Economics 661, acquaintance with conventional trade analysis, or permission of the instructor.

E. Grinols.

The course will cover advanced topics in international economics not normally covered in International Economics 661.

664 International Economics: Balance of Payments and International Finance Spring. 4 credits. Staff.**[670 Economic Demography and Development** Fall. 4 credits. Not offered 1981-82.]**671 Economics of Development** Spring. 4 credits. E. Thorbecke.**[672 Economics of Development** Fall. 4 credits. G. Fields. Not offered 1981-82.]**673 Development in a Polarized World** Fall. 4 credits. Prerequisites: Economics 311-312. J. Svejnar.

The impact of the international economic order on the development efforts of less-developed countries. Emphasis is on such topics as the gains from trade, commercial policy and industrialization, risks of specialization, synthesis of development theory and trade theory, the North-South confrontation, proposals for reform of the international economic order, commodity agreements and development, international income transfers, and direct foreign investment.

[674 Economic Systems Spring. 4 credits. G. J. Staller. Not offered 1981-82.]**[678 Economic Growth in Southeast Asia** Spring. 4 credits. Not offered 1981-82.]**[679 Theory of Quantitative Economic Policy** Spring. 4 credits. M. Gertler. Not offered 1981-82.]**681 Economics of Participation and Labor-Management Systems: Theory** Fall. 4 credits. J. Vanek.

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 The Practice and Implementation of Self-Management Spring. 4 credits. J. Svejnar. Not offered 1981-82.]**684 Seminars in Advanced Economics** Fall and spring. 4 credits. Staff.

English

A. R. Parker, chairman; T. D. Hill, director of undergraduate studies 323 Goldwin Smith Hall, 256-3335. M. H. Abrams, B. B. Adams, A. R. Ammons, J. P. Bishop, J. F. Blackall, L. Brown, A. Caputi, C. Chase, M. J. Colacurcio, J. Culler, D. D. Eddy, S. B. Elledge, R. T. Farrell, E. G. Fogel, D. Fried, L. Green, L. Herrin, N. Hertz, M. Jacobus, P. Janowitz, C. V. Kaske, R. E. Kaske, R. Kirschten, C. S. Levy, A. Lurie, D. E. McCall, K. A. McClane, J. R. McConkey, H. S. McMillin, P. L. Marcus, D. M. Memmin, R. Morgan, T. C. Murray, D. Novarr, S. M. Parrish, M. A. Radzinowicz, B. Rosecrance, E. Rosenberg, P. L. Sawyer, D. R. Schwarz, M. Seltzer, H. E. Shaw, S. Siegel, W. J. Slatoff, J. Stallworthy, S. C. Strout

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, 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.

Courses for Sophomores

Although courses numbered in the 200's are primarily for sophomores, some of them are open to qualified freshmen and to upperclass students. Courses approved for the major are English 201, 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.
Fall: M W F 11:15; M. Radzinowicz, S. Elledge.
Spring: M W F 11:15; M. H. Abrams, J. Stallworthy. Interpretation of major works ranging from *Beowulf* through those of Yeats. English 201 surveys Old

English poetry, Chaucer, medieval romances, Spenser, Shakespeare, Donne, and Milton. 202 includes Dryden, Swift, Pope, Samuel Johnson, Blake, Jane Austen, the major Romantic and Victorian poets, Shaw, and Yeats. The course will be conducted by a combination of lectures and intensive seminars in special topics.

Courses Primarily for Nonmajors

205–206 Readings in English and American Literature 205, fall; 206, spring. 3 credits each term. Open to all undergraduates. English 205 is not a prerequisite to 206.

Fall: M W F 10:10; L. Brown. Spring: M W F 10:10; J. Culler.
205: An introduction to some of the major works of English and American literature from the sixteenth to the nineteenth century. We will discuss a variety of genres—including novels, plays, satires, and lyric poems—from the English Renaissance, the eighteenth century, and the American Renaissance. Our first object will be the individual work—its special accomplishments and problems. Our general concerns will be the relationship of these works to their historical contexts and the nature of their significance today. Readings will be from such writers as Shakespeare, Marlowe, Jonson, Donne, Wycherley, Pope, Swift, Defoe, Fielding, Johnson, Hawthorne, Melville, and Twain.

206 covers literature since the mid-nineteenth century, including such authors as Browning, Shaw, D. H. Lawrence, Hardy, Yeats, Hemingway, Faulkner, and Robert Frost. Two lectures and a small discussion section each week. Two short papers and a final.

208 Forms of Poetry Fall. 3 credits.

M W F 11:15; D. Fried.
This is an introductory course for which no previous literary training is assumed. The aim of the course is to develop the students' skills in reading and talking about poetry, through the close study of a wide range of short poems. Inquiring into the implications of Wallace Stevens' claim that "All poetry is experimental poetry," we will explore how poets make rules for themselves in order to break them and create poetic traditions by transgressing against traditional forms. Not a historical survey, "Forms of Poetry" will group poems according to the poetic devices and formal patterns they share. From time to time throughout the course questions of poetic form will be studied through analogues from painting, architecture, and popular culture. Poets to be read include Shakespeare, Herbert, Pope, Blake, Keats, Poe, Whitman, Dickinson, Frost, Williams, Bishop, Merwin, and Ammons. Requirements: two brief (two to three pages) papers, and in-class midterm examination, and a final examination.

227 Shakespeare Fall or spring. 3 credits. Each section limited to 25 students.

M W F 10:10 or 1:25 or T R 12:20–1:35 or 2:30–3:45. C. Levy and others.
A critical study of representative plays from the principal periods of Shakespeare's career.

265 Contemporary Afro-American Literature Spring. 3 credits.

T R 8:40–9:55. K. McClane.
If one wishes to understand the inner workings of a neighbor's household, it is often a good idea to consult the maid. By the same token, if one wishes to understand American society, to understand it fully, one must ask those who have been its metaphoric housekeepers—that is, black people. This course does just that: it attempts to define American experience through the works of selected contemporary black writers, showing indeed that there may be two distinct American experiences: one black and one white. It is also my intention that we develop some understanding of the commonality of the dispossessed and of those forces—powerful and deep—which characterize Third World

consciousness. Novels, poetry, and plays by Zora Neal Hurston, Gwendolyn Brooks, Richard Wright, Toni Morrison, James Baldwin, Imamu Baraka, Chinua Achebe, and William Melvin Kelley.

285 Writing About the Arts at Cornell Fall. 3 credits.

T R 10:10–11:25. T. Murray.
The course will train students to describe works of art including painting, photography, architecture, film, and dramatic productions. It will focus on developing students' sensitivity to critical choices and positions. As a means of promoting appreciation of the creative arts on campus, the course will study artifacts being displayed, performed, and read on campus. Ideally, the course will encourage and contribute to public review of campus artistic events.

288–289 Expository Writing 288, fall; 289, spring. 3 credits each term. Each section limited to 18 students.

M W 9:05 or 10:10 or T R 2:30; plus conferences to be arranged. S. Parrish, N. Kaplan, and others.
This course is intended to meet the needs of undergraduates from a range of disciplines who wish to gain skill in expository writing. Under the instructor's direction, students will write on topics related to their own interests. A substantial amount of new writing or a revision of an earlier essay will be expected each week. Since the class is the primary audience for the essay, attendance and participation in discussion by all students are essential. In addition to regularly scheduled class meetings, instructors will hold frequent conferences with students.

200-Level Courses Approved for the Major

Students may take up to two of the following courses for credit toward the English major.

207 Twentieth-Century Biography Spring. 4 credits.

M W F 12:20; D. Novarr.
An introduction to some forms of modern biography, traditional and experimental, to see how writers have represented and illuminated character and achievement. Subjects range from Leonardo da Vinci and Martin Luther to George Washington, F. Scott Fitzgerald, and Marilyn Monroe; writers from Freud and Erikson to Lytton Strachey, Virginia Woolf, and Norman Mailer. Consideration of the values of biography, biographical "truth," the relation of biography to history, psychology, ethics, and the novel.

247 Major Nineteenth-Century Women Novelists (also Women's Studies 248) Fall. 4 credits.

M W F 1:25; J. F. Blackall.
This course gives particular attention to the biographical and social circumstances surrounding the novels, their critical reception within their own time, and the themes and subject matter that women novelists elected to write about. The reading includes masterworks and certain other works that exerted a major imaginative influence on contemporary readers. Readings for 1981 are: Austen, *Persuasion*; C. Brontë, *Jane Eyre*; E. Brontë, *Wuthering Heights*; Gaskell, *Mary Barton*; Stowe, *Uncle Tom's Cabin*; Eliot, *The Mill on the Floss*; Gilman, "The Yellow Wallpaper"; Chopin, *The Awakening*; Wharton, *Ethan Frome*; and a twentieth-century imaginative sequel to *Jane Eyre*, Jean Rhys's *Wide Sargasso Sea*.

248 Feminist Issues in Nineteenth- and Twentieth-Century Literature (also Women's Studies 249) Spring. 4 credits.

M W F 1:25; M. Jacobus.
An introductory course in writing by and about women, exploring the relation between women, literature, and feminism. There will be five main areas of concern: work and home; education and marriage; sexuality; motherhood; and the woman artist or writer herself. Readings will include novels by Charlotte

Brontë, Charles Dickens, George Eliot, Thomas Hardy, Virginia Woolf, Sylvia Plath, Margaret Atwood, and Adrienne Rich, as well as a variety of texts drawn from writers on women and feminism from Mary Wollstonecraft to the present day.

253 The Modern Novel Fall. 4 credits.

M W F 12:20. B. Rosecrance.

A survey of English, European, and American novels and shorter fiction, with some attention to their contemporary, historical and intellectual contexts. Works by such writers as Conrad, Joyce, Lawrence, Forster, Woolf, Mann, Kafka, Nabokov, Faulkner, and one or two contemporary Americans will be considered.

267 Twentieth-Century Southern Fiction Spring. 4 credits.

M W F 12:20. L. Herrin.

The course will deal exclusively with the fiction of the twentieth-century American South—arguably, in time and place, the richest concentration of writers we have—and will proceed more or less chronologically. After a brief background survey, the course will begin with William Faulkner, then move to Thomas Wolfe, James Agee, and Robert Penn Warren. The stories and short novels of Katherine Anne Porter, Flannery O'Connor, Carson McCullers, and Eudora Welty will make up one part of the course, as will the short work of three black writers, Richard Wright, Ernest Gaines, and Gayl Jones. The semester will end with novels by two contemporaries, William Styron and Walker Percy, and, if time permits, by one or two others. Short interpretative papers and class discussion.

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 their present-day attitudes and values. 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 experiences, attitudes, and values.

295 Introduction to Semiotics (also Comparative Literature 295) Fall. 4 credits.

M W F 11:15. J. Culler.

Adopting the semiotic perspective, we will study culture as a series of systems of convention or sign systems. Readings will focus on phenomena such as literature, advertising, schizophrenia, fashion, food, and tourism. No previous knowledge assumed.

Courses which Satisfy the Major Prerequisite

270 The Reading of Fiction Fall or spring.

3 credits. 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. Each section limited to 22 students. 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 2:30 or 11:15 or 10:10 or T R 12:20–1:35 or 10:10–11:25. C. Chase, M. Jacobus, P. Marcus, S. McMillin, D. Schwarz, and others.

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—Chekhov, James, Conrad, Faulkner, Mann, Kafka, and others.

271 The Reading of Poetry Fall or spring.

3 credits. 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. Each section limited to 22 students. May be used to satisfy either the Freshman Seminar requirement or the distribution requirement in the humanities, but not both.

M W F 10:10 or T R 10:10–11:25. C. Levy, J. Stallworthy and others.

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. 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. Each section limited to 22 students. May be used to satisfy either the Freshman Seminar requirement or the distribution requirement in the humanities, but not both.

Fall and spring: T R 2:30–3:45 or M W F 11:15. T. Murray, and others.

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: M W F 9:05; D. Fried. Spring: M W F 11:15; M. Seltzer.

The problem of an American national literature is explored through the reading and discussion of eight texts representing the four principal periods in American literary history. Not a survey, this course focuses on the relations of the texts to each other, the role of Americanness in those relationships, and the assumptions about history with which critical appreciation must engage. Among the writers whose work is studied are Franklin, Poe, Hawthorne, Dickinson, Twain, James, and Frost.

280–281 Creative Writing 280, fall; 281, spring.

3 credits each term. Recommended for prospective majors in English. Prerequisite for English 281: recommendation from English 280 instructor. Each section limited to 18 students.

M W 9:05 or 12:20 or 2:30 or 3:35 or T R 9:05 or 12:20 or 2:30. P. Janowitz, R. Kirschten, and others. An introductory course in the theory and practice of writing narrative prose, poetry, and allied forms.

Courses for Sophomores, Juniors and Seniors

Courses at the 300 level are open to juniors and seniors, and to others with the permission of the instructor. There are no specific prerequisites, except as noted for English 382–383 and 384–385.

Major Periods of English Literature

322 The Seventeenth Century Spring. 4 credits.

M W F 10:10. D. Novarr.

Emphasis on the main traditions in poetry from Donne and Jonson to Marvell—the metaphysical poets, the Sons of Ben, the Spenserian inheritance; major prose works from Bacon to Walton, prose style, and genres in prose; some consideration of the achievement in drama.

330 Restoration and Eighteenth-Century Literature Spring. 4 credits.

M W F 1:25. L. Brown.

A course in the history of English literature from 1660 to 1790, concentrating on generic evolution and on the relationship between literature and society. Major themes will include the development of the novel, the

nature of satire, the literary characteristics of sentimentalism, the rise of "pre-romantic" poetry, and the interactions among all these phenomena. Works by Wycherley, Dryden, Swift, Pope, Defoe, Richardson, Fielding, Goldsmith, Sheridan, and Johnson.

333 The Eighteenth-Century English Novel Fall. 4 credits.

M W F 1:25. H. Shaw.

Studies in major works of eighteenth-century fiction. This year the course will concentrate on Richardson and Fielding, by giving a good deal of time to *Tom Jones* and *Clarissa* and by drawing on other authors, working in various genres, who are important to them (Milton, Pope, Swift). We will also read novels by Defoe, Sterne, and Austen.

340 The Romantic Poets Fall: 4 credits.

M W F 11:15. S. M. Parrish.

A close reading of the poems of Blake, Coleridge, Wordsworth, Byron, Shelley, and Keats, together with some of their letters and their critical writings.

345 The Victorian Period Spring. 4 credits.

T R 10:10–11:25. D. Mermin.

The poetry of Tennyson, Browning, Arnold, and the Pre-Raphaelites; two novels, *Great Expectations* and *Middlemarch*; selections from works by Carlyle, Ruskin, Mill, Darwin, Pater, and others; plays by Wilde and Shaw. Lectures and discussion. Concentrating on close reading of texts, the course will consider the relationship of the literature to the art, science, religion, and politics of the time, the development of new literary forms, and the Victorians' own sense of living in "an age of transition."

350 The Early Twentieth Century (to 1914) Fall. 4 credits.

M W F 10:10. D. R. Schwarz.

Critical study of major works by Hardy, Conrad, Lawrence, Joyce, Eliot, Yeats, Hopkins, Wilde, and others. While the emphasis will be upon individual works, some attempt will be made to place the authors and works within the context of literary and intellectual history. The course will seek to define the development of literary modernism in England by reference to these authors' innovations in themes and techniques. These literary works will be examined as part of a transition in British culture that takes place between 1890 and 1914.

351 Modern Literature since 1914 Spring. 4 credits.

M W F 10:10. J. Stallworthy.

Interpretations of modern English, Anglo-Irish, and Anglo-Welsh poetry, fiction, and drama by Yeats, Shaw, Lawrence, Eliot, Forster, Woolf, Waugh, O'Casey, Auden, Beckett, and others. Although the emphasis in lectures and discussions is upon individual works, the wider context of literary, intellectual, and social history is also considered.

Major English Authors

319 Chaucer Spring. 4 credits.

M W F 11:15. T. Hill.

The main emphasis is on *Troilus* and *The Canterbury Tales*, but some attention will also be given to the early poems and the question of Chaucer's development as a poet.

327 Shakespeare Fall. 4 credits.

M W F 9:05. B. B. Adams.

An introduction to the works of Shakespeare, based on a selection of plays representative of the stages of his artistic development and the range of his achievement.

329 Milton Fall. 4 credits.

M W F 9:05. M. Radzinowicz.

An introduction to the poetry of John Milton. Of the major poems, *Comus*, *Lycidas*, *Paradise Lost*, and *Samson Agonistes* will be closely read; other of Milton's works will be considered only when necessary to establish context.

Major Periods of American Literature

361 Early American Literature Fall. 4 credits.

M W F 11:15. 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.

English 361 recommended, but not a prerequisite.
M W F 10:10. D. Fried.
America's literary maturity at mid-century: the individual masterpieces and the interrelated careers of Emerson, Thoreau, Hawthorne, Melville, Whitman, and Dickinson.

363 The Age of Realism and Naturalism Fall. 4 credits.

M W F 10:10. M. Seltzer.
The literary expression of new attitudes toward American society and the individual between the Civil War and the early years of the twentieth century, primarily as exemplified in representative writing by Mark Twain, W. D. Howells, Henry James, Mary Wilkins Freeman, Charles W. Chesnutt, Henry Adams, Stephen Crane, and Theodore Dreiser.

364 American Literature in the Twentieth Century Spring. 4 credits.

M W F 9:05. D. McCall.
A pursuit of the idea of modernity through a variety of American texts from just before the First World War to the present. The authors represented include the principal poets from Frost to Lowell; Fitzgerald, Hemingway, and Faulkner from the standard writers of prose fiction; and some more recent black writers, women writers, critics, and journalists.

Genres and Special Topics

366 The Earlier American Novel: Brockden Brown to Henry James Fall. 4 credits.

M W F 1:25. D. E. McCall.
A survey of major American novels of the nineteenth century. Writers studied include Hawthorne, Melville, Mark Twain, Howells, Chopin, and James.

367 The Modern American Novel Spring. 4 credits.

M W F 1:25. W. Slatoff.
A survey of major American novels of the twentieth century. Writers studied include Dreiser, Crane, Fitzgerald, Hemingway, West, Wright, Faulkner, Agee.

370 The Nineteenth-Century English Novel Spring. 4 credits.

M W F 12:20. E. Rosenberg.
Survey of works by major English novelists in the nineteenth century. Probable reading list will include Austen, *Pride and Prejudice*; Thackeray, *Henry Esmond*; Dickens, *Little Dorrit*; Eliot, *Middlemarch*; Meredith, *The Egoist*; Hardy, *Tess of the d'Urbervilles*; Conrad, *Nostromo*.

372 English Drama (also Theatre Arts 372) Spring. 4 credits.

M W F 10:10. H. S. McMillin.
Important events in the English theatre from the beginning to the twentieth century. Plays by Marlowe, Shakespeare, Jonson, Webster, Dryden, Wycherly, Behn, Congreve, Sheridan, Shelley, Shaw, and others. Relationships between play houses, dramatic texts, and politics.

Creative and Expository Writing

382-383 Narrative Writing 382, fall; 383, spring. 4 credits each term. Prerequisite: English 280-281 or permission of instructor. Each section limited to 15 students.

T R 12:20 or 2:30 or M W 2:30; plus conferences to be arranged. Fall: A. Caputi, W. Slatoff; spring: D. McCall, L. Herrin.

The writing of fiction; study of models; analysis of students' work.

384-385 Verse Writing 384, fall; 385, spring. 4 credits each term. Prerequisite: English 280-281 or permission of instructor. Each section limited to 15 students.

T 2:30-4:25. Fall: A. R. Ammons, P. Janowitz; spring: P. Janowitz, K. McClane.
The writing of poetry; study of models; analysis of students' poems; personal conferences.

388 The Art of the Essay: Autobiography Fall. 4 credits. Prerequisite: permission of instructor.

Limited to 18 students. Interested students should submit a writing sample to Professor McMillin before the beginning of the term.

T R 10:10-11:25 and conferences to be arranged.
H. 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. De Quincey, V. Woolf, J. Agee.

389 The Art of the Essay Spring. 4 credits.

Prerequisite: permission of instructor. Limited to 18 students. Interested students should submit a writing sample to Professor Levy before the beginning of the term.

T R 1:25-2:15 and conferences to be arranged.
C. Levy.
For both English majors and nonmajors who have done well in such courses as Freshman Seminars or English 288-289, and who desire intensive practice in writing expository and personal essays; particular, but not exclusive, emphasis on expository techniques of analysis and persuasion.

Courses for Advanced Undergraduates

Enrollment in courses at the 400 level is limited by prerequisite or permission of instructor.

403 Poetry and Crisis Fall. 4 credits. Limited to 15 students.

M W F 2:30. R. Kirschten.
The course centers on aesthetic ways poets have used their poetry to deal with personal crises. Whether their problems be religious, emotional, or cultural, our concern will be to use historical evidence to understand tactics of poetic expression which provide partial resolution of these problems. We will use letters, biographies, theological treatises, anthropological and linguistic studies, recordings, films. We will read six poets, each paired with a particular issue: Emily Dickinson and crisis of affection, T. S. Eliot and religious crisis, Hart Crane and mythic crisis, Wallace Stevens and metaphysical crisis, Theodore Roethke and psychological crisis, James Dickey and ritual crisis.

408 Evolution of Epic Spring. 4 credits.

T R 10:10-11:25. M. Radzinowicz.
The course is concerned with the poetic and thematic transformation of a genre often and prematurely called dead. It will explore such topics as epic tradition and poetic originality; the bard and his presence or absence; the social and historical components of heroic virtue; and unity and fragmentation in long poems. Readings, sometimes in selections, will include Spenser, *The Faerie Queene*; Milton, *Paradise Lost*; Dryden, *The Hind and the Panther*; Blake, *Milton*; Wordsworth, *The Prelude*; Whitman, *Song of Myself*; and Melville, *Clarel*; William Carlos Williams, *Paterson*. A final epic poem may be chosen by the class from among Berryman, *Dream Songs*; Lowell, *History*; or David Jones, *Anathemata*.

409 Freud as Imaginative Writer and Reader Spring. 4 credits. Limited to 15 students.

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. Open to all students who have taken at least one literature course at the 200 level or above.

415 The English Language (also English 615) Spring. 4 credits.

R 3:35-5:30. 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.

424 Lyric Sequences (also English 624) Fall. 4 credits. Limited to 15 students.

R 1:25-3:20. 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 works of Sidney, Greville, Spenser, and Shakespeare. Discussion format; one or two shorter papers and a term paper.

427 Studies in Shakespeare: Shakespeare on Film Spring. 4 credits.

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 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 film makers 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*, *The Tempest*, (video and a new British release).

430 Eighteenth-Century Intellectual Prose Texts (also English 631) Fall. 4 credits. Prerequisite: permission of the instructor.

T R 10:10-11:25. D. D. Eddy.
Major aesthetic, religious, political, and critical texts will be examined, ranging chronologically from John Locke's *Second Treatise on Civil Government* to Reynolds' *Discourses on Art*. Also included will be Shaftesbury's *Characteristics* (with John Brown's commentary), Burke *On the Sublime and Beautiful*, Joseph Warton's *Essay on Pope*, Mandeville's *Fable of the Bees*, Hume's *Dialogues Concerning Natural Religion*, and Hogarth's *Analysis of Beauty*.

434 Restoration and Eighteenth-Century Drama (also English 634) Fall. 4 credits.

T 1:25-3:20. L. Brown.
A course in the history of the drama from 1660 to 1780, emphasizing the continuities and contradictions in the evolution of the genre. The major movements of the Restoration and eighteenth-century English theater—heroic drama, comedy of manners, pathetic tragedy, stage sentimentalism, and bourgeois tragedy—will be discussed in the context of the social and cultural history of the age, and defined in relation to the rise of the novel and the development of "pre-romantic" poetry. The reading list includes Dryden, *Etherege*, Wycherley, *Otway*, Lee, Vanbrugh, Congreve, Steele, Gay, Fielding, Lillo, Goldsmith, and Sheridan. Reading will be augmented by film productions of several eighteenth-century plays.

440 Readings in Romanticism (also Comparative Literature 461) Fall. 4 credits.

T R 12:20-1:35. C. Chase.
Readings in poetry and prose by Wordsworth, Rousseau, Shelley, Keats, and Baudelaire. Focusing

on how these works engage and dispute with each other, the seminar will consider questions they raise about understanding, memory, and the nature of language, and will take up problems of interpretation posed by Romantic writing—the question of reference, the tension between truth and fiction, the significance of irony. Readings in Rousseau and Baudelaire available in English.

442 The Romantic Movement in Poetry, Painting, and Graphic Arts (also History of Art 459) Spring. 4 credits.

T R 10:10–11:25. J. Visconti.
This course will examine the works of English Romantic poets and artists who have in one way or another responded to the problems of medium and to the risk of technical distortion and who have attempted to make poem, painting, and print less a vehicle for an idea and more an idea to be experienced. The works include Blake's illuminated books, the lyrical poetry of Coleridge and Keats, and the watercolor paintings of Cousins, Girtin, and Turner. The similarities among these diverse arts, both in technique and theme will also be discussed. Knowledge of the visual arts and art history is not required.

450 The History of the Book Spring. 4 credits.
Prerequisite: permission of instructors. Limited to 20 students.

T 7–9 p.m. D. Eddy and P. Kahn.
Morphology of letters (calligraphy and type). Abbreviations and their cultural significance. Printing and its terminology. The book trade. Texts and their transmission. The book as a physical object. The impact of the book on social and economic changes. The book as a work of art.

451 Twentieth-Century Women Writers (also English 651 and Women's Studies 451) Spring. 4 credits.

W 2:30–4:25. B. Rosecrance.
A consideration of selected fiction by British women writers from the turn of the century to the present day, including writers of English, Irish, Australian, Canadian, and South African origin. Critical study of stories and novels will emphasize evolutions in the craft and artistic consciousness of women writers in this period. We will draw upon works of such writers as Sarah Grand, Olive Schreiner, Ada Levenson, Dorothy Richardson, Virginia Woolf, Katherine Mansfield, Elizabeth Bowen, Jean Rhys, Barbara Pym, Rebecca West, Christina Stead, Iris Murdoch, Doris Lessing, Nadine Gordimer, Margaret Atwood, Margaret Drabble, Antonia (Drabble) Byatt, and Susan Hill. The emphasis will be on lesser-known novelists within the earlier period and on both well- and lesser-known contemporary writers.

453 The Trial of Oscar Wilde Fall. 4 credits.

T R 12:20–1:35. S. Siegel.
What influence do Art and Life have on one another? Is all Art moral or immoral? Should some art be censored? What are the limits of privacy? These Victorian preoccupations were addressed and acted out at the trial of Oscar Wilde. Reports of the trial in the periodical press contributed greatly to the shaping of the legend of the Wilde we have come to know. The "text" for this seminar will be the transcripts of the trial; the reports that circulated in the press; and works by Wilde, particularly those that authorized that legend, but simultaneously serve to dispel it.

456 Edith Wharton, Willa Cather, and Eudora Welty (also Women's Studies 456) Spring. 4 credits.

T R 2:30–3:45. J. F. Blackall.
A representative selection of the best fiction of three distinguished American women writers with particular regard to their practice of the craft of fiction and their achievements as regionalist writers. Reading prospectively to include Wharton, *The House of Mirth*, *Ethan Frome*, "The Bunner Sisters," and *The Age of Innocence*; Cather, *My Antonia*, *A Lost Lady*, *The Professor's House*, and *Death Comes for the*

Archbishop; Welty, *The Robber Bridegroom*, *The Optimist's Daughter*, and selected short stories. A discussion course, with several short papers and a longer essay.

459 Four Modern Masters: Pirandello, Brecht, Beckett, Pinter Spring. 4 credits.

M W F 2:30. A. Caputi.
A study of selected works by these figures against the background of modernism since World War I.

463 The Political Novel in America (also English 660) Fall. 4 credits. Limited to 15 students.

R 1:25–3:20. C. Strout.
Critical study of radical, conservative, and liberal politically oriented novels by important writers from 1869 to 1971. Examples from Adams, Twain, James, Steinbeck, Dos Passos, Hemingway, Warren, Ellison, Doctorow, and others. The novel is considered both as a source of insight and as a historical source.

464 American History and the Literary Imagination (also English 691) Spring. 4 credits.

W 1:25–3:20. C. Strout.
The interplay between the literary and historical imaginations in various forms of narrative are examined. Certain controversial American events are focused on, such as the Salem Witchcraft trial, the Nat Turner slave revolt, Huey Long's career, the Oppenheimer Security Hearing, the Rosenberg spy case, and the March on the Pentagon. Texts include literary works by Hawthorne, Adams, Twain, Mailer, Styron, Warren, Miller, and Doctorow; pertinent documents and readings in controversies over interpretation and the overlap between history and literature.

470 Studies in the Novel: Faulkner and Hemingway Fall. 4 credits. Limited to 25 students.

T R 10:10–11:25. W. Slatoff.
Study and discussion of the major fiction. Students will be expected to have prior acquaintance with some works by each of the authors.

471 History into Fiction Fall. 4 credits. Open to nonmajors.

T R 12:20. H. Shaw.
What makes a historical novel "historical"? Answers to this question are sought by exploring works of historical fiction by such authors as Scott, Balzac, Thackeray, Dickens, and Tolstoy. Some attention is given to literary theory, the philosophy of history, and the various authors' historical sources, but the primary focus is on the works themselves. Our discussions should provide a fruitful meeting ground for people with different areas of interest and expertise; non-English majors are welcome.

472 Irish Literature Spring. 4 credits.

M W F 9:05. P. L. Marcus.
An examination of major works of the "Irish Renaissance." The literary texts will be studied in their cultural, political, and historical contexts, including the language movement, the revival of the Celtic past, the agitation for Home Rule, and the War for Independence. Authors will include Joyce, Yeats, Synge, O'Casey, Flann O'Brien.

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 1981. 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*.

478 Women and Writing: Wollstonecraft to Woolf (also Women's Studies 478) Fall. 4 credits.

M W F 11:15. M. Jacobus.
The course will focus on works by and about women, clustering in four main areas: Romantics and after (Mary Wollstonecraft, Mary Shelley, Emily Brontë), Victorians (Charlotte Brontë, Tennyson, Elizabeth Barrett Browning), the New Woman Fiction of the 1890s (Hardy, Olive Schreiner, Ibsen), and modernists (Gertrude Stein, Katherine Mansfield, Virginia Woolf). The aim will be twofold: first, to consider questions about women's writing and the representation of women and women's issues; second, to complement an examination of the sexual and political ideology in literature with readings from important feminist documents and with current theoretical work toward a specifically feminist critique.

479 On Reading Women Poets (also Women's Studies 479) Spring. 4 credits.

T R 12:20. S. Siegel.
An examination of the traditional controversy over whether or not reading, writing, and gender are related to one another. Detailed study of the autobiographical, critical, and poetic writings of Amy Lowell, Hilda Doolittle, Marianne Moore, Sylvia Plath, and Adrienne Rich. The seminar will consider salient departures from conventional poetic modes and themes and the pressures each poet has felt to be significant in her attempt to shape herself, her esthetic, and her poetry. Discussion will begin with a specific question which will recur throughout the semester: How would Virginia Woolf have read these poets?

480–481 Seminar in Writing 480, fall; 481, spring. 4 credits. Limited to 15 students. Prerequisites: English 382–383 or 384–385, and permission of instructor.

Fall: W 2:30–4:25. A. Lurie. Spring: T 12:20–2:15. W. Slatoff.

Intended for those writers who have already gained a basic mastery of technique. Students normally enroll for both terms and should be capable of a major project—a collection of stories or poems, a group of personal essays, or perhaps a novel—to be completed by the end of the second semester. Seminars are used for discussions of the students' manuscripts and published works that individual members have found of exceptional value.

488 Writing about Literature Fall. 4 credits. Limited to 15 students.

M W F 10:10. N. Hertz.
This is a class for upperclassmen—preferably seniors—who want more practice writing and who are curious about why people write about literature in the variety of ways they do. Short exercises will be assigned each week and commented upon, but the discussion will focus on the institutional contexts in which writing about literature is produced and consumed and on the relations among various kinds of discourse—classroom talk, literary criticism, literary scholarship, literary theory, et cetera.

489 Poets on Writing (also English 795) Spring. 4 credits.

T R 10:10–11:25. P. Janowitz.
In this course, we will explore, through the comments of outstanding, primarily modern poets, a variety of ideas on the purposes, functions, and possibilities of poetry, as well as on the stance of the poet in relation to language, self, and world. Our goal will be twofold: to expand our understanding of the purposes and possibilities of poetry, and to relate these processes, goals and possibilities to our own aims and practices as creative writers, to broaden our sense of what is possible in our own work. Students will be required to select two texts from the syllabus and to lead seminar discussions of these works; in addition, they will write a final paper (15–20 pages) in which at least one of the readings is related either to aspects of the student's own work, or to another work in the field.

Suggested readings for the course include:

W. C. Williams: "Spring and All;" Keats: *Letters*; Rilke: *Letters to a Young Poet*; W. Stevens: "The Noble Rider and the Sound of Words;" W. B. Yeats: *Letters on Poetry to Dorothy Wellesley*; A. R. Ammons: *Essay on Poetics*; Wordsworth: "Preface to Lyrical Ballads;" Pound: *The ABC of Reading*; G. Stein: *How to Write*; along with pertinent selections from the writings of Jarrell, Kunitz, Rich, Rukeyser, Olson, and others to be decided upon by seminar participants.

491 Honors Seminar I: Modern Poetry: Yeats, Eliot, Ammons Fall. 4 credits.
T R 2:30–3:45. L. Green.

Close readings in these three major modern poets. We will pay particular attention to the poetic and rhetorical stances assumed by the poets *vis-à-vis* myth, history, and nature. Students will be encouraged to develop their own critical responses as we consider similarities and differences in the poetic discourses of the three poets, whose writing and lives cover an historical span between the nineteenth century and the present.

492 Honors Seminar II: The Evolution of the Novel Spring. 4 credits.
T R 12:20–1:35. D. R. Schwarz.

A study of the rise of the novel in the eighteenth century and the development of the novel form in selected works of the nineteenth century. Readings will include *Moll Flanders*, *Tom Jones*, *Clarissa*, *Tristram Shandy*, *Emma*, *Vanity Fair*, *Bleak House*, and *Jude the Obscure*. Some attention will be given to theoretical problems involved in the study of fiction.

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.

611 Old English Literature Fall. 4 credits.
R. T. Farrell.

612 Beowulf Spring. 4 credits.
T. D. Hill.

613 Middle English Literature Fall. 4 credits.
R. E. Kaske.

614 Medieval Drama Spring. 4 credits.
B. B. Adams.

615 History of the English Language Spring. 4 credits.
B. B. Adams.

619 Chaucer Spring. 4 credits.
T. D. Hill.

622 Seventeenth-Century Prose Spring. 4 credits.
M. Radzinowicz.

624 Lyric Sequences Fall. 4 credits.
C. Levy.

627 Shakespeare Fall. 4 credits.
E. Fogel.

631 Eighteenth-Century Critical and Intellectual Prose Fall. 4 credits.
D. D. Eddy.

632 The Age of Johnson Spring. 4 credits.
N. Hertz.

634 Restoration and Eighteenth-Century Drama Fall. 4 credits.
L. Brown.

641 Readings in Romanticism (Including the Prelude) Fall. 4 credits.
M. Jacobus.

642 Romantic Masterworks Spring. 4 credits.
M. H. Abrams.

646 Victorian Prose Fall. 4 credits.
P. Sawyer.

653 Emergence of Modernism Fall. 4 credits.
S. Siegel.

654 The 1920s Spring. 4 credits.
P. Marcus.

656 Twentieth-Century Women Novelists Spring. 4 credits.
B. Rosecrance.

660 Political Novel in America Fall. 4 credits.
C. Strout.

663 American Realism Spring. 4 credits.
C. Strout.

665 Classic American Poets Fall. 4 credits.
R. Morgan.

666 Modern American Poets Spring. 4 credits.
E. Fogel.

670 Evolution of the Novel I Fall. 4 credits.
E. Rosenberg.

671 Evolution of the Novel II Spring. 4 credits.
D. Schwarz.

678 Theory of Tragedy Spring. 4 credits.
T. Murray.

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 Introduction to Criticism and Literary Theory Spring. 2 credits.
J. Culler.

710 Medieval Bibliography Spring. 5 credits.
A. Groos.

712 Research in Old English Fall. 5 credits.
T. Hill.

727 Shakespeare Spring. 5 credits.
H. S. McMillin.

748 Topics in Victorian Poetry Spring. 5 credits.
D. Mermin.

753 Yeats Fall. 5 credits.
J. Stallworthy.

763 James Fall. 5 credits.
J. F. Blackall.

778 George Eliot Spring. 5 credits.
N. Hertz.

780.1 Writing Seminar Fall. 5 credits.
D. McCall.

780.2 Writing Seminar Fall. 5 credits.
K. McClane.

781.1 Writing Seminar: Poetry Spring. 5 credits.
R. Morgan.

781.2 Writing Seminar: Prose Spring. 5 credits.
J. McConkey.

793 Master's Essay Fall or spring. Noncredit.
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 Departments of Comparative Literature and Women's Studies 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

European Epic (Comparative Literature 311)

Medieval Literature (Comparative Literature 343–344)

Modern Drama (Comparative Literature 354)

Introduction to the Culture of the Later Renaissance (Comparative Literature 362)

European Novel (Comparative Literature 363–364)

The Later Eighteenth Century (Comparative Literature 415)

Readings in the New Testament (Comparative Literature 429)

Deconstruction and Literary Criticism (Comparative Literature 681)

French

See Modern Languages, Literatures, and Linguistics, p. 142, and Romance Studies, p. 173.

Geological Sciences

D. L. Turcotte, chairman; A. L. Bloom, director of undergraduate studies; 211 Kimball Hall, 256-5232. S. B. Bachman, W. A. Bassett, J. M. Bird, L. D. Brown, J. L. Cisne, A. K. Gibbs, B. L. Isacks, D. E. Karig, S. Kaufman, R. W. Kay, J. E. Oliver, F. H. T. Rhodes, E. A. Robinson, 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.

The Major

The prerequisites for admission to a major in geological sciences in the College of Arts and Sciences are two of the two-semester sequences of courses chosen from the following, or their equivalents: Biological Sciences 101-103 and 102-104; Chemistry 207-208, Mathematics 191-192; and Physics 112-213. Geological Sciences 101-102 is recommended, but a student with a strong foundation in mathematics and science may be accepted as a major without completion of 101-102.

Majors take the five core courses in geological sciences, a summer field geology course, six credits of additional course work from geological sciences courses numbered 300 or 400, and a third two-semester sequence chosen from the courses in biological sciences, chemistry, mathematics, and physics listed above, plus an additional course in one of these fields at an intermediate or advanced level.

Core Courses

325	Structural Geology
355	Mineralogy
356	Petrology and Geochemistry
376	Sedimentology and Stratigraphy
388	Geophysics and Geotectonics

Prospective majors should consult one of the following departmental major advisers: W. A. Bassett, 222 Kimball Hall; S. B. Bachman, 213 Kimball Hall; R. Kay, 304A Kimball Hall; J. Oliver, 209 Kimball Hall; A. L. Bloom, 211 Kimball Hall; J. L. Cisne, 308A Kimball Hall, or A. K. Gibbs, 224 Kimball Hall, as early as possible for advice in planning a program. Students majoring in geological sciences may attend the departmental seminars and take advantage of cruises, field trips, and conferences offered through the Department of Geological Sciences.

Courses offered at the 100 and 200 level are open to all students. Certain 300-level courses in geology may be of particular interest to students of chemistry, biology, ecology and physics. Students are encouraged to inquire about courses that interest them at the department office, 210 Kimball Hall.

Honors. An honors program is offered by the Department of Geological Sciences for superior students. Candidates for honors must maintain an overall 3.0 grade point average, a cumulative average of 3.5 in the major, and complete a senior thesis (Geological Sciences 490). Students interested in applying should contact their advisers during the second semester of the junior year.

German Literature

P. Hohendahl, chairperson; H. Deinert, director of undergraduate studies. E. A. Blackall, I. Ezerzgalis, S. L. Gilman, A. Groos, P. W. Nutting.

The Department of German Literature offers courses in 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 the eighteenth and nineteenth centuries. The department often jointly sponsors courses with other departments in the humanities, such as music and the history of art.

For information about majors and courses see Modern Languages, Literatures, and Linguistics, p. 144.

Government

I. Kramnick, chairman; B. R. O'G. Anderson, D. E. Ashford, M. G. Bernal, S. Buck-Morss, W. J. Dannhauser, A. T. Dotson, M. J. Esman, B. Ginsberg, S. Jackson, G. McT. Kahin, M. Katzenstein, P. Katzenstein, E. W. Kelley, E. G. Kenworthy, R. King, P. Leeds, T. J. Lowi, D. Meyers, D. P. Mozingo, T. J. Pempel, G. H. Quester, J. Rabkin, R. H. Rosecrance, M. Rush, L. Scheinman, M. Shefter, S. G. Tarrow, N. T. Uphoff, P. Vaughan

To accommodate new courses or course changes, a supplementary announcement is prepared by the department. Before enrolling in courses or registering each term students are requested to consult the current supplement listing courses in government, available in 125 McGraw Hall.

The Major

For a major in government the following requirements must be completed: (1) three of the following introductory courses: Government 111, 131, 161, 181; (2) a minimum of 24 additional credits in government department courses numbered 300 or above; (3) in related subjects, a minimum of 12 credits selected with the approval of the adviser from courses numbered 300 or above in the Departments of Anthropology, Economics, History, Philosophy, Psychology, and Sociology. S-U options are not allowed for any course taken to fulfill major requirements.

Juniors and seniors majoring in the Department of Government who have superior grade records may apply for supervised study in government with a particular instructor, whose consent is required. Admission is by application only.

Cornell-in-Washington Program. Government majors also have an opportunity to apply to the Cornell-in-Washington program in which students take courses and undertake a closely supervised internship during a fall or spring semester.

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.

Honors. A small number of exceptionally well-qualified students are accepted each year in the honors program. Admission is by application and is competitive. Students who wish to be considered must complete an application in the spring semester of their sophomore or junior year. Those who are admitted will register for Government 400. Successful completion of Government 400 entitles the student to write an honors thesis (Government 494, eight credits) in the senior year, provided other requirements have been met. The decision to award honors and in what degree will be based on the

quality of the thesis or paper, the student's record in government courses, and the student's overall record at Cornell. Interested students should consult the supplement available in the departmental office in 125 McGraw Hall. Further inquiries may be addressed to the Director of Undergraduate Studies, 100 McGraw Hall.

Introductory Courses

111 The Government of the United States Fall. 3 credits.

B. Ginsberg and M. Shefter.
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 Spring. 3 credits.

R. Rosecrance.
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 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.

Cornell-in-Washington

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.

American Government and Institutions

Government 111 is recommended.

301 The Politics of Regulation Fall. 2 credits.

Course will be open to all, but is recommended for students intending to participate in the Cornell-in-Washington Program.
The primary purpose of this course is to establish for undergraduates who are interested in questions of

public policy, and possibly attracted to the Cornell-in-Washington Program, a seminar on campus which does not require in-depth immersion in a number of other government courses. Students will be expected to attend eight seminars of their own choosing from the ones that IPE and CAPE sponsor each term. They will also be required to meet five times during the term for two hours each as a group in a seminar to discuss key readings in the field of regulation and public policy. Students will be expected to complete a writing project which lays out a particular problem they hope to work on in Washington. Students who decide against spending a term in Washington will write a paper of equivalent length which relates some of the readings they have done to one or two of the seminars by guest speakers.

302 The Impact and Control of Technological Change (also Economics 302 and CRP 440) Spring. 4 credits.

S. Del Sesto.
The role of technology as a factor in social, economic, and political change is examined. Issues, institutions, and mechanisms in the control of technology, particularly environmental regulations, are discussed.

[303 American Democracy and the Limits to Growth] 4 credits. Not offered 1981-82.]

309 Interpretation of American Politics Fall. 4 credits.

R. King.
This course shall attempt to move beyond description of specific institutions and policies to initiate a more theoretical discussion of the general characteristics of the polity that exists in America. The primary theme for the term will concern the joint presence of both capitalism and mass democracy, the different forms this association has taken over time, and the inherent congruities and incongruities between these two basic, constitutive elements.

310 Power and Poverty in America Spring. 4 credits.

R. King.
The United States is a stratified society conspicuous for great disparities in the allocation of income and wealth. Given democratic political institutions, one might have expected substantial popular efforts at redistribution. After reviewing the surprisingly small net fiscal effect of the federal government, we shall turn to explicitly welfare programs, surveying their particular forms and results. The principal goal for the term is to examine poverty policies insofar as they shed light on the conventional social science question: Who rules America? Attention will be given to competing interpretations of the partition of political power, to the modes of organization and participation of the poor, and to conditions necessary for significant readjustments in policy focus.

[311 Urban Politics] 4 credits. Not offered 1981-82.]

312 Urban Affairs Laboratory Fall or spring (if there is a minimum registration of 40 students). 4 credits. Open to both undergraduate and graduate students. Application required to assure balanced enrollment from different colleges and majors. Application available in 125 McGraw of G32 Uris Hall. Course fee, \$20.

P. C. Vaughan.
An interdisciplinary course in urban affairs which 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.

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 1981-82.]

316 The American Presidency Spring. 4 credits.

A. T. Dotson.
Analysis of the politics of the presidency and the executive branch with emphasis on executive-legislative relations, executive branch policy-making, and the problems of the modern presidency.

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 1981-82.]

[321 Public Policy and Public Revenues] 4 credits. Not offered 1981-82.]

323 The "Fourth" Branch Fall. 4 credits.

A. T. Dotson.
The national administrative branch is examined. Particular attention is given to the constitutional and political problems that result from the rise of administrative power.

327 Civil Liberties in the United States 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.

406 Politics of Education Spring. 4 credits.

E. W. Kelley.
Education is simultaneously America's biggest business and the set of formal and informal processes through which skills and values are passed on to the next generation. A topic involving both basic values and so much money must be the subject matter of politics. This course will deal with conflicts about and the politics of education as they occur at both national and state levels. What

(including values) will be taught, to whom; who will benefit from formal education as a vehicle for entry into economic opportunity? What are the powers and restrictions on both state and national government in this area? How does the American system, in particular, its politics, differ from other systems? These and other questions, like the effects of constitutional, electoral, and legislative rules and structures on educational policies, will be considered.

[411 Political and Economic Power in Cities] 4 credits. Not offered 1981-82.]

[412 Size of the State] 4 credits. Not offered 1981-82.]

414 The Administrative State Fall. 4 credits.

J. Rabkin.
The course will examine the problem of how or whether legitimate governmental authority can be distinguished from arbitrary coercion in the modern era of pervasive regulation. It will consider 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. 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 1981-82.]

[426 Science, Technology, and Public Policy (also B&PA NPA 504)] 4 credits. Not offered 1981-82.]

[428-429 Government and Public Policy: An Introduction to Analysis and Criticism] 4 credits. Not offered 1981-82.]

Comparative Government

Government 131 is recommended.

330 Soviet Union: Politics, Economics, and Culture Fall. 4 credits.

G. Gibian, D. Holloway, and G. Staller.
Interdisciplinary survey of the USSR since the Revolution, with emphasis on contemporary developments.

332 Politics and Society in France and Italy Spring. 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] 4 credits. Not offered 1981-82.]

334 Business and Labor in Politics Spring. 4 credits.

T. J. Pempel.
Historically business and labor have been critical elements in shaping the specific politics of most advanced industrial democracies. Land grants to United States railroad magnates, the rotten boroughs in English elections, unionization and class consciousness in continental Europe, the development of social welfare programs, and colonization and imperialism are but a few of the foremost examples. Today such interactions are similarly crucial in such diverse areas as the rise of multinational corporations, immigrant labor, strikes by public-sector employees, racial and class exclusionism in unions, environmental pollution,

consumer protection, and electoral financing. The historical and contemporary roles of business and labor in such areas are examined in different industrialized democracies.

[335 Cuba: Culture and Revolution] 4 credits. Not offered 1981-82.]

336 The Ethnic Dimension in Politics Fall. 4 credits.

M. J. 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] 4 credits. Not offered 1981-82.]

[341 Society and Politics in Central Europe] 4 credits. Not offered 1981-82.]

[342 Government and Politics of Canada] 4 credits. Not offered 1981-82.]

344 Government and Politics of Southeast Asia Fall. 4 credits.

B. R. O'G. Anderson.

The organization and functioning of the political systems of Southeast Asia is analyzed, with special attention to the problems of postcolonial social and political development.

346 Politics in Contemporary Japan Fall. 4 credits.

T. J. Kempel.

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.

D. P. Mozingo.

An examination of the politics of modern China including the breakdown of the traditional order and the revolutionary struggle of the Chinese Communist party. Primary emphasis on the institutions, methods, policies, and problems of the Communist regime since 1949.

[348 Politics of Industrial Societies] 4 credits. Not offered 1981-82.]

349 Political Role of the Military Fall. 4 credits.

B. R. O'G. Anderson.

Comparative study of selected modern states and types of political systems in which the military have played a major role in domestic politics. Attention is given to the social and ideological character of the politicized military and various forms of military government.

350 Comparative Revolutions Fall. 4 credits.

D. P. Mozingo.

An analysis of major revolutionary movements since World War II: their sociopolitical origins, ideology, and organization, with special emphasis on contrasting strategies and roads to power.

351 Democracy in Britain and France Fall. 4 credits.

D. Ashford.

Comparison of municipal and local government policies with particular interest in central controls, municipal reform and local politics in unitary systems of government. The impact of the welfare state on local democracy and participation will be studied as

it relates to regional politics and planning, spending controls, party organization and voluntary organizations. The central question will be how, if at all, local democratic influence is exercised over policymaking at higher levels of government.

[352 The Roots of Greek Civilization (also Near Eastern Studies and College Scholar 346)] 4 credits. Not offered 1981-82.]

[353 Women and Politics (also Women's Studies 353)] 4 credits. Not offered 1981-82.]

[355 From Politics to Policy: The Political Economy of Choice] 4 credits. Not offered 1981-82.]

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 1981-82.]

[358 Politics of the Middle East] 4 credits. Not offered 1981-82.]

365 Social Movements and Politics in Industrial Societies 4 credits. Fall.

S. G. Tarrow.

Studies of historical and contemporary social movements and left-wing parties in Western Europe and the United States, with an emphasis on the relations between movement strategies, between political alliances and policy outcomes.

[430 The Politics of Productivity: Germany and Japan] 4 credits. Not offered 1981-82.]

[435 Politics of Decentralization and Local Reform] 4 credits. Not offered 1981-82.]

[446 Comparative Communism] 4 credits. Not offered 1981-82.]

456 Policymaking in Britain and France Spring. 4 credits.

D. Ashford.

Historical and contemporary efforts to shape the social, economic, and institutional forces within unitary governments. The major problems to be considered are control of the bureaucracy, economic planning, industrial relations and trade unions, devolution and regional movements, race and migrant labor policies. The central issue will be who makes policy in the European welfare state.

[459 Politics in Contemporary Europe: The Politics of the Left] 4 credits. Not offered 1981-82.]

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.

[363 Classics in Political Thought] 4 credits. Not offered 1981-82.]

364 Liberty, Equality, and the Social Order Spring. 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 1981-82.]

368 Economic Models of Politics Spring. 4 credits.

E. W. Kelley.

Economic factors influencing the structure of political systems and economic models of such systems are considered. The rationalistic presumptions underlying some such models are introduced and modified. Applications to enduring policy arenas may be made.

[373 Feminist Political Thought] 4 credits. Not offered 1981-82.]

[375 American Political Thought] 4 credits. Not offered 1981-82.]

[376 Marx] 4 credits. Not offered 1981-82.]

379 Freud Fall. 4 credits.

S. Buck-Morss.

Analysis of Freud's own writings on psychological and social theory, clinical practice, and analytic method. Consideration of the political implications of these texts and their philosophical contribution. Critical discussion of post-Freudian revisions of the theory, including Left Freudianism, ego-psychology, and radical feminism.

466 The Repressed Feminine in the Writings of Marx Fall. 4 credits.

S. Buck-Morss.

An analysis of language, sexuality, and power.

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. The topics for fall 1981 will be equal opportunity and civil disobedience. In considering equal opportunity, we will study alternative approaches to justice, the wrong of discrimination, the idea of social responsibility, and the justifiability of different programs aiming to compensate for past discrimination. In exploring the problem of civil disobedience, we will ask what is the basis of political authority, why we are obligated to obey the law, what is the difference between civil disobedience and rebellion, and how civil disobedience can be justified.

International Relations

Government 181 is recommended.

382 Integration in the World System Fall. 4 credits.

S. Jackson.

This seminar explores theories of interdependence, regional integration, and dependency as particular applications of the generalized concept of integration in the world system. Readings include works by Deutsch, Haas, Keohane, Nye, Lenin, Cardoso.

[383 Theories of International Relations] 4 credits. Not offered 1981-82.]

[384 Defense Policy and Arms Control] 4 credits. Not offered 1981-82.]

385 Contemporary American Foreign Policy Spring. 4 credits.

S. Jackson.

An analysis of the dilemmas that have confronted American foreign policy since 1945, both specific problems and more general questions of capabilities, priorities, and morality.

386 Structure and Process in the Global Political Economy Spring. 4 credits.

S. Jackson.

We will examine the global structures and transnational processes which constrain and condition economic development. We will look at global structures through the operations of multinational corporations, international trade, and world debt. We will look at transnational decision making at the nongovernmental, official bilateral, and official multilateral level, including such actors as governments, the United Nations Conference on Trade and Development, and the Roman Catholic Church, with an emphasis on North-South relations.

[387 The United States and Asia 4 credits. Not offered 1981-82.]**389 International Law** Spring. 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, 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 Spring. 4 credits.

D. P. Mozingo.

An analysis of Chinese concepts of foreign relations and the policymaking process in the People's Republic of China. Emphasis is on such topics as the contemporary Chinese view of their position in the international community and a comparison of the making and implementation of contemporary Chinese policies with respect to such areas as the Soviet bloc, Afro-Asian countries, and the West.

478 Accumulation on a World Scale Fall. 4 credits.

S. Jackson.

In *Accumulation on a World Scale*, Samir Amin has developed the nearest thing to comprehensive explanation for underdevelopment in the periphery of the world system to emerge from recent critical theorists of global political economy. In this course, we will examine Amin chapter by chapter, looking at the growing body of systematic evidence relevant to an evaluation of Amin's theory.

479 Dependencia and the State Spring. 4 credits.

S. Jackson.

In the first half of this course, we will examine closely a sampling of the principal theoretical and empirical works that seek to explain the constraints on and possibilities for state action in dependent societies. We will focus particularly on those factors arising directly from the location of countries in the global system, including the role of multinational corporations, the World Bank, and military aid. In the second half of the course, each student will select and complete a research project on a question related to dependencia and the state. We will operate as a research workshop to define, guide, present, and critique the research being done by each member of the workshop.

[480 Foreign Economic Policies of Advanced Industrial Societies 4 credits. Not offered 1981-82.]**481 Foreign Policy of the USSR** Spring. 4 credits.

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, and 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 1981-82.]**[483 Political and Economic Interdependence** 4 credits. Not offered 1981-82.]**[485 Logic and Methods of Research in International Relations** 4 credits. Not offered 1981-82.]**Political Methodology****[391 Human and Social Statistics** 4 credits. Not offered 1981-82.]**Honors Courses****400 Honors Seminar: Political Analysis** Fall. 4 credits. Limited to honors students.

M. Shefter.

494 Honors Thesis Fall or spring. 8 credits.

In their senior year, honors students will be required to take Government 494, in which they will prepare and write an honors thesis—an extended piece of original independent research. Before the end of the semester that precedes the semester in which the thesis is to be written, each participant must submit an approved proposal to the department office. Proposal forms may be obtained from the undergraduate secretary in 125 McGraw Hall. Honors theses are given to a second reader for evaluation and students are examined orally on their work by the two faculty members involved. In cases where students feel the need for a period of preparatory work before undertaking an honors thesis, they may make use of the option available under Government 499.

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. Consult the supplement which lists graduate courses, available in the department office.

Field Seminars**601 Scope and Method of Political Analysis**

Spring. 4 credits.

P. G. Leeds, R. Rosecrance.

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 Methodology 4 credits. Not offered 1981-82.]**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.

D. Ashford.

An introduction to the study of public policy. Various analytical approaches will be presented: models of public choice and political economy; analysis of bureaucratic politics, executive and political leadership, and interest groups and public opinion; economic analysis of public finance and welfare economics; and organization theory, game theory, and decision theory as these relate to the analysis of public policy formation and applications.

605 Field Seminar in Comparative Politics Spring. 4 credits.

B. Anderson.

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 Fall. 4 credits.

L. Scheinman.

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.

I. Kramnick.

An introduction to political theory through a reading of selected classics in political thought from Plato to Marx.

American Government and Institutions**[618 American Political Behavior** 4 credits. Not offered 1981-82.]**[621 Elections and Public Policy** 4 credits. Not offered 1981-82.]**623 Capitalism, the State, and the Economy** Spring. 4 credits.

R. King.

This seminar will seek to investigate problems of state and economy on two related levels. First, how does the location of the United States federal government within a capitalist society affect our understanding of

its forms and policies? Second, in what sorts of conjunctions, productive and political, does that government intervene into the 'private' economy, affecting rates of profitability and growth, the selective allocation of benefits, and even the very structure of industry? Readings will be principally drawn from contemporary Marxist theory and from empirical works on the American political economy.

Public Policy

628 Politics of Technical Decisions I (also B&PA NPA 515 and CRP 541) Fall. 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.

629 Politics of Technical Decision II (also B&PA NPA 516 and CRP 542) 4 credits. Not offered 1981-82.]

Comparative Government

636 Political Development of the European Welfare State Fall. 4 credits.

D. Ashford.
An analysis of the development of the European welfare state, primarily in its various forms in Britain, France, West Germany, and Sweden. Roughly a third of the time will be devoted to an historical analysis of how social, economic, and political factors influenced the early definitions of the goals of the welfare state as well as the procedures and programs each country found appropriate. Consideration will then be given to the various explanations for the more rapid development since World War I: industrialization, class politics, ideology, and partisan politics. The last portion of the course deals with the more recent problems of financing and distributing social benefits and public assistance under pressures to reduce social spending, as well as the theory and concepts of comparative analysis of the advanced welfare state.

637 Comparative Theories of Decentralization Fall. 4 credits. Not offered 1981-82.]

639 Politics of the Soviet Union 4 credits. Not offered 1981-82.]

642 The Politics of Communalism Fall. 4 credits

M. J. Esman.
A review, analysis, and evaluation of the major theoretical literature on the genesis, expression and management of political conflict resulting from ethnic, religious, racial, and linguistic pluralism.

645 Politics of China 4 credits. Not offered 1981-82.]

647 Political Anthropology: Indonesia (also Anthropology 628) Spring. 4 credits. Prerequisite: reading knowledge of Indonesian.

B. R. O'G. Anderson, J. T. Siegel.
The relationship of politics to culture is studied through the works of such authors as Ivan Simatupang, Pramoedya Ananta Toer, and Armijn Pané.

648 Political Economy of Change: Rural Development in the Third World Fall. 4 credits.

N. T. Uphoff.
The substantive focus is on economic, social, and political change in Third World countries, particularly with reference to rural development. The analytical approach integrates economic, social, and political factors into a common framework for dealing with policy choices and political action. Special attention is given to different instruments for promoting rural development in Third World countries.

651 Readings from Mao Zedong 4 credits. Not offered 1981-82.]

652 Political Problems of Southeast Asia 4 credits. Not offered 1981-82.]

655 Latin American Society and Politics 4 credits. Not offered 1981-82.]

656 Comparative Institutions and the Welfare State 4 credits. Not offered 1981-82.]

659 Politics in Postwar Western Europe Fall. 4 credits.

S. G. Tarrow.
This course is a survey of the post-World War II European political systems, which will use some major approaches to the politics of advanced industrial democracies to analyze the main periods and problems of postwar European politics. The periods and topics covered are Reconstruction, the transition to mass democracy and the growth of the welfare state; mature party-systems, neocorporatism and the 'end' of ideology; the resurgence of class conflict, party dealignment and 'post-industrial' cleavages; no-growth politics, realignment and attacks on the welfare state. Students will prepare critical review essays on particular theoretical problems or on particular countries in Western Europe.

660 Research Topics on Advanced Industrial Democracies: Social Movements, Collective Protest, and Policy Innovation Spring. 4 credits

S. G. Tarrow.
Students will read and carry out case studies on historical or contemporary West European and American protest movements, their programs and the responses—whether repressive or policy-innovative—of political elites. Theories of collective action and resource mobilization will be studied and used in explicating cases.

Political Theory

665 American Political Thought 4 credits. Not offered 1981-82.]

666 The Political Philosophy of Nietzsche 4 credits. Not offered 1981-82.]

667 Philosophical Foundations of Contemporary Politics 4 credits. Not offered 1981-82.]

668 Foundations of English Liberation 4 credits. Not offered 1981-82.]

669 Modern Social Theory Fall. 4 credits

S. Buck-Morss.
Readings from Marx, Weber, and Simmel on modern society and consciousness, with an emphasis on the political implications of method.

670 Toward a Feminist Social Theory 4 credits. Not offered 1981-82.]

673 Economic Models of Politics Spring. 4 credits.

E. W. Kelley.
Both economic factors influencing the structures of political systems and economic models of such systems are considered. The rationalistic presumptions underlying such models are introduced and modified. Applications to enduring policy arenas may be made.

678 Greek Political Philosophy 4 credits. Not offered 1981-82.]

International Relations

686 International Strategy 4 credits. Not offered 1981-82.]

687 International Relations of Asia Spring. 4 credits.

G. McT. Kahin.
American Southeast Asian policies: their genesis, character, impact, and long-term consequences. Elements involved in the formation of American policies toward Southeast Asia by the several postwar administrations (Truman through Carter) including international factors and American domestic politics. The ways in which these policies have been applied and their influence on political forces within the countries of Southeast Asia and upon American policies towards other countries.

692 The Administration of Agricultural and Rural Development Spring. 4 credits.

M. Esman, N. Uphoff.
The political, bureaucratic, economic, and technical environments of administration for agricultural and rural development; the various functions involved in administration (personnel management, planning, budgeting, economic analysis, information systems); several major tasks (research, extension, services, and infrastructure development), and specific problems of integrating activities, interfacing with rural populations, and utilizing external assistance. Intended primarily for persons who expect to have some future responsibilities in agricultural or rural development administration in Third World countries.

Greek

See Department of Classics, p. 106.

Hebrew

See Department of Near Eastern Studies, p. 159.

Hindi-Urdu

See Modern Languages, Literatures, and Linguistics, p. 140.

History

R. L. Moore, chairman; I. V. Hull, director of undergraduate studies; 323 McGraw Hall, 256-3359.
D. A. Baugh, A. H. Bernstein, S. Blumin, S. G. Cochran, T. H. Holloway, C. Holmes, J. J. John, M. Kammen, S. L. Kaplan, J. V. Koschmann, D. C. LaCapra, W. F. LaFeber, J. M. Najemy, M. B. Norton, C. A. Peterson, W. M. Pintner, R. Polenber, W. B. Provine, J. H. Silbey, F. Somkin, B. Strauss, B. Tierney, D. Usner, J. Weiss, L. P. Williams, O. W. Wolters, D. K. Wyatt

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 are 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 the Introduction to Western Civilization (History 151-152) or the Introduction to Asian

Civilization (History 190–191), or alternatively, three courses in European history—one in ancient history; one in medieval, Renaissance, or early modern history; and one in modern history.

- 2) Take history department courses totalling 36 credits (which may include the prerequisite courses) and complete all these courses with a grade of C or better—of the 36 credits, a minimum of 20 must be taken in courses numbered 250 and above.
- 3) Take a minimum of 8 credits in each of two of the following fields: American, European, Asian, Latin American, history 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, the Honors Proseminar, which is normally taken in the junior year or, at the latest, in the fall of senior year. (Honors candidates are strongly encouraged to take another 400-level seminar during their junior year.) Upon successful completion of the proseminar, students may become candidates for the degree of Bachelor of Arts with honors in history by submitting to a prospective faculty adviser a written thesis proposal delineating the general area of inquiry for an honors essay and having the proposal approved by the adviser. The proposal should be submitted as soon as possible after the completion of History 400, normally during the junior year or at the beginning of the senior year.

After acceptance of the proposal by an adviser, honors candidates should then enroll with their advisers in History 302, Supervised Research, during the first term of their senior year. History 302 is a four-credit course which permits honors candidates to conduct research and to begin writing the honors essay. At the end of the first semester of the senior year, as part of the requirements for History 302, the student will submit to his or her adviser a ten to fifteen page overview of the entire thesis or a draft of some substantial section of the thesis and will undergo an oral examination on the broad field of history which the student researched. The examination will be administered by a committee consisting of the student's adviser and one other department member, who will eventually serve as a reader of the thesis. The committee will then recommend whether the student may proceed to enroll in History 401, Honors Guidance, during the final semester of senior year. History 401 is a 4-credit course that permits honors candidates to complete the honors essay and to prepare both to defend the essay and to demonstrate their understanding of the general historical interests they have pursued within the major. Students who do not take History 400 in their junior year must submit both the thesis proposal and the prospectus by the end of the fall semester of their senior year in order to be eligible to enroll in History 401 by their final semester.

Honors candidates must complete a minimum of 40 credits in history, 8 of which must be History 400–401. The completed thesis will be examined by three readers, including the two faculty members who administered the preliminary oral examination.

The text of the honors essay may not exceed sixty pages except by permission of the chairperson of the honors committee and the student's adviser. Two copies will be due during the third week of April. In May each honors candidate will be given an oral examination administered by the major adviser and

one or both of the essay readers. The examination will focus on the specific issues of the essay as well as the broad field of history in which the student has concentrated his or her research (e.g. Periclean Athens, seventeenth-century science, nineteenth-century America).

To qualify for a Bachelor of Arts degree with honors in history, a student must (1) sustain at least a B+ cumulative average in all history courses; and (2) earn at least a *cum laude* grade on the honors essay and on the oral examination.

Students considering the honors program should consult Professor Wyatt during the second term of their sophomore year or early in their junior year.

Freshman Seminars

105 The Growth of Political Democracy in the United States Spring. 3 credits.

M 3:30. 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.

[107 The Family in American History Spring. M. B. Norton. Not offered 1981–82.]

108 Civil Liberties in the United States Fall. 3 credits. Prerequisite: permission of the instructor.
T R 2:30–3:45. 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 ACLU 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 Fall. 3 credits.

T 2:30–4:30. 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.

114 Seminar on American Foreign Policy Spring. 3 credits. Open to freshmen and sophomores. Limited to 12 students; preference will be given to those who are not history majors. Prerequisite: permission of instructor.

T 1:25–3:20. W. LaFeber.
The seminar will examine a contemporary American foreign policy problem, analyzing its various parts and charting the possible alternatives open to policymakers by placing the problem in its historical framework and using in part, the methods of comparative history. History will be used as a tool to analyze the complexities and opportunities of present foreign policy dilemmas.

119 History of North American Indians Spring. 4 credits.

R 1:25–3:20. 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.

[146 America in the Camera's Eye Spring. R. L. Moore. Not offered 1981–82.]

151–152 Introduction to Western Civilization

151, fall; 152, spring. 4 credits each term. History 151 is not a prerequisite to 152. Either term or both may be used to fulfill the Freshman Seminar requirement.

Fall: T R 9:05, plus disc to be arranged. C. Holmes.
Spring: T R 9:05, plus disc to be arranged, L. P. Williams.

A survey of European history, History 151 covers antiquity to the Reformation; 152 spans the sixteenth 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.

161 The Heroic Ideal in Ancient Literature Fall. 3 credits.

M W 2:30–3:45. B. Strauss.
An examination of one of the outstanding figures of ancient literature: the hero. The course studies the origin and growth of the heroic ideal in four civilizations: Mesopotamia, Israel, Greece, and Rome. We will consider the differences between each civilization's conception of heroism, what these differences indicate more generally about each civilization's spirit and values, and the lessons of ancient heroism for modern times. Readings in translation from the Epic of Gilgamesh, the Bible, Homer, Aeschylus, Sophocles, Plato, Virgil.

[171 Revolution and Russian Society W. M. Pintner. Not offered 1981–82.]

174 Foodways: A Social History of Food and Eating Fall. 3 credits.

M 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. Illustrative examples are drawn from throughout history, from ancient Egypt to the present.

176 Britain and the Second World War Spring. 3 credits. Prerequisite: permission of instructor. Open to freshmen and sophomores.

R 2:30–4:30. Freshman seminar students must have T 3:35 available for writing class. D. A. Baugh.
The aim is to uncover the true facts of Britain's conduct and situation from 1936 to 1946. Emphasis is on the fighting on land, sea, and in the air, but preparedness, economic warfare, diplomacy, and imperial power are considered. Topics include the Battle of Britain, the Battle of the Atlantic, and strategic bombing.

192 Japan and the West Fall. 3 credits. Prerequisite: permission of instructor.

M W 1:25. J. V. Koschmann.
Fall 1981 topic: The Japanese in World War II. An examination of the war from the perspective of the Japanese, touching on rationales for pursuing it, the wartime experiences of ordinary Japanese, the impact of American bombing, and aspects of the war crime trials.

193 China and the West Before Imperialism

Spring. 3 credits. Open to freshmen and sophomores. Prerequisite: permission of instructor.

T R 1:25. C. A. Peterson.
What accounts for the first great passion for things Chinese in the West in the seventeenth and eighteenth centuries, and then its recession before the waves of imperialism? This seminar explores this question, tracing the China vogue in thought, literature, art, and the crafts, and making reference to actual circumstances in the China of the day.

[194 Chinese Views of Themselves Spring. S. Cochran. Not offered 1981–82.]

Underclass Seminars

220 English Constitutional History to 1600 Fall. 4 credits. Prerequisite: permission of instructor. M W 9:05. F. G. Marcham.

A study of Anglo-Saxon law and government; Norman administrative and legal ideas as they relate to monarchy and feudalism; evolution of central government under Henry II; Magna Carta; the evolution of Parliament and the central court system. Examination of laws, charters, royal decrees, financial records, and parliamentary documents, all in translation. Reading and discussion focuses on original documents; occasional lectures supply political narrative.

221 English Constitutional History, 1600 to the Present Spring. 4 credits. Prerequisite: permission of instructor. M W 9:05. F. G. Marcham.

A study of the Tudor monarchy; constitutional conflicts of the seventeenth century; the Glorious Revolution; evolution of cabinet government; general governmental reform of the nineteenth century; twentieth-century democracy, the welfare state, and a nationalized economy. Statutes, parliamentary debates, court decisions, and the reports of commissions are examined. Reading is in original documents; occasional lectures supply political narrative.

225 Public Life and Literature in Nineteenth-Century Great Britain Fall. 4 credits. Prerequisite: permission of instructor. T R 9:05. F. G. Marcham.

British political, constitutional, economic, and imperial history are studied in the light of Victorian prose, poetry, and drama. History and literature are both considered; history through lectures and discussions of constitutional documents; literature through comment upon readings. Authors assigned include Macaulay, Carlyle, Tennyson, Mill, Darwin, Huxley, Gilbert and Sullivan, and Shaw.

226 Public Life and Literature in Twentieth-Century Great Britain Spring. 4 credits. Prerequisite: permission of instructor. T R 9:05. F. G. Marcham.

A study of British political, social, and constitutional history is paralleled by the reading of plays. Both history and literature are considered. The development of parliamentary democracy in Great Britain, the consequences for her of the two world wars, the emergence of the welfare state, the application to the economy of nationalization, and Great Britain's withdrawal from imperialism are presented. Among the writers read and discussed are Shaw, Barrie, Maugham, O'Casey, Sherrif, and Eliot.

[232 Urban Problems and Policy in Historical Perspective Spring. S. Blumin. Not offered 1981-82; next offered 1982-83.]

Comparative History

[300 Early Warfare, East and West Fall. C. A. Peterson. Not offered 1981-82; next offered 1982-83.]

[407 Death in Past Time Spring. S. L. Kaplan. Not offered 1981-82.]

[449 Comparative Slave Systems in the Americas Fall. T. H. Holloway and M. B. Norton. Not offered 1981-82.]

History of Science

[281-282 Science in Western Civilization 281, fall; 282, spring. L. P. Williams. Not offered 1981-82.]

[284 Undergraduate Seminar in the History of Biology (also Biological Sciences 204 and College Scholar 284) W. Provine. Not offered 1981-1982.]

287-288 History of Biology (also Biological Sciences 201-202) 287, fall; 288, spring. 3 credits each term. Prerequisite: one year of introductory biology. 287 is not prerequisite to 288. T R 10:10-11:30. W. Provine.

An examination of the history of biology, emphasizing the interaction of biology and culture. Original writings of biologists constitute the bulk of reading assignments. The fall semester covers the period from classical antiquity to 1900. The spring semester is devoted entirely to twentieth-century biology.

[380 Social History of Western Technology J. Weiss. Not offered 1981-82; next offered 1983.]

385 Problems in the History of Biology Fall. 4 credits. No prerequisites. T 2:30-4:25. W. B. Provine.

Mechanism, design, and ethics in relation to the development of modern biology.

386 Problems in the History of Biology Spring. 4 credits. Prerequisite: elementary knowledge of evolutionary biology and genetics. T 2:30-4:25. W. B. Provine.

The evolutionary synthesis. An examination of the grand synthesis in evolutionary biology in the 1930s and 1940s, including its origins and present status.

[481-482 Science in Classical Antiquity L. P. Williams. Not offered 1981-82.]

680 Seminar in the History of Nineteenth-Century Physical Science Spring. 4 credits. Hours to be arranged. L. P. Williams.

American History

[201 Introduction to American History: From the Beginning to 1865 Fall. F. Somkin. Not offered 1981-82.]

[202 Introduction to American History: From the Civil War to Recent Times Spring. F. Somkin. Not offered 1981-82.]

275 Crime and Punishment: From the Puritans to Mickey Spillane Spring. 4 credits. Limited to 25 students. No prerequisites. R 2:30-4:25. F. Somkin.

A reading discussion course. Social sanctions and the transgressor will be examined in selected novels and other materials. Texts include fiction by Hawthorne, Cooper, Stowe, Melville, Van T. Clark, Cain, Hammett, and Chandler.

[311-312 The Structure of American Political History 311, fall; 312, spring. Offered alternate years. J. H. Silbey. Not offered 1981-82; next offered 1982-83.]

313-314 History of American Foreign Policy 313, fall; 314, spring. 4 credits each term. T R S 11:15. W. LaFeber.

History 313 examines policy and policy makers from Ben Franklin to Woodrow Wilson; 314 covers Wilson to Carter. Emphasis is placed on domestic events that shaped foreign policy.

[316 Puritanism, the Enlightenment, and the Republic: American Cultural and Intellectual History to 1820 Fall. F. Somkin. Not offered 1981-82.]

317 American Civilization: The Nineteenth Century Spring. 4 credits. No prerequisites, but basic knowledge of American history recommended. M W F 1:25. F. Somkin.

Ideas, thinkers, feeling, and expression from the Age of Reason to the edge of anxiety. Topics include the contradiction between ideals and reality, the

individual and society; Mormonism; temperance, women's rights, communitarianism, and antisavery; Darwinism; the Gospel of Wealth; the rise of originality and radicalism in art, architecture, literature, and social thought.

318 American Constitutional Development Spring. 4 credits. M W F 9:05. 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 court.

321 The Origins of American Civilization Spring. 4 credits. M W F 1:25. M. Kammen.

The colonial genesis of American culture and society, with emphasis upon the emergence of distinctive institutions, attitudes, and social patterns. Topics include race relations, religion, politics, movements of protest, and cultural developments.

323-324 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 beginnings of European contact to the present. Cultural, political, and economic changes experienced by particular societies will be covered. Emphasis given to general themes of Indian-White relations, comparative tribal histories, and the role of Native Americans in the overall history of the United States.

325 Age of the American Revolution, 1763-1815 Fall. 4 credits. T R 8:30-9:55. 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 Spring. M. B. Norton. Not offered 1981-82; next offered 1982-83.]

330 The United States in the Middle Period, 1815-1850 Fall. 4 credits. M W F 1:25. disc to be arranged. J. H. Silbey.

An analysis of American society from the end of the second war with England to the crisis of 1850, stressing the developing trends of nationalism and sectionalism, the rise and results of Jacksonian democracy, and the internal tensions produced by physical growth and slavery.

331 The American Civil War and Reconstruction Spring. 4 credits. M W F 1:25. 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 S. Blumin. Not offered 1981-82; next offered 1982-83.]

[336-337 American Social History S. Blumin. Not offered 1981-82; next offered 1983-84.]

[340-341 Recent American History, 1920 to the Present R. Polenberg. Not offered 1981-82; next offered 1982-83.]

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. Course emphasizes the intellectual impact of

major political and economic events and the adaptation of social ideas and values to new conditions.

346 Major Themes in American Religious History Spring. 4 credits.

M W 11:15; disc to be arranged. R. L. Moore.
An examination of the impact of American religions upon American culture and politics from Massachusetts Bay to the Civil War. Major topics include the puritans and American Calvinism, religion and the American Revolution, the evangelical movement and the antebellum political order, and the cultural meaning of religious diversity.

[411 Undergraduate Seminar in American Political History] J. H. Silbey. Not offered 1981-82.]

414 Motivations of American Foreign Policy Fall. 4 credits. Prerequisites: History 314 and permission of instructor.

R 1:25-3:15. W. LaFeber.

[418 Undergraduate Seminar in the History of the American South] J. H. Silbey. Not offered 1981-82.]

[419 Undergraduate Seminar in American Social History] Fall. S. Blumin. Not offered 1981-82; next offered 1982-83.]

426 Undergraduate Seminar in Early American History Fall. 4 credits. Prerequisite: permission of instructor. Preference will be given to students who have completed History 326, HDFS 258, or Women's Studies 438.

T 2:30-4:30. M. B. Norton.
Topic for 1981: Women in early America.

429 Undergraduate Seminar: American Indians in the Eastern United States Fall. 4 credits.

R 2:30-4:30. D. H. Usner.
A seminar examining the history of Native Americans east of the Mississippi River from the colonial era to the present. The cultural and economic participation of American Indians in the evolution of frontier societies as well as the impact of Indian-non-Indian relations on tribal societies will be studied. Major topics include fur trade networks, political alliances, warfare, resistance against removal, and the persistence of Indian communities within eastern states.

[430 Law and Authority in America: Freedom, Restraint, and Judgment] F. Somkin. Not offered 1981-82.]

440 Undergraduate Seminar in Recent American History Fall. 4 credits. Prerequisite: permission of instructor.

T R 12:20-1:35. R. Polenber.
Topic for 1981: Anarchism in America.

[445 Undergraduate Seminar: Deviance and Conformity in a Liberal Society] R. L. Moore. Not offered 1981-82.]

521 Heritage and Memory in American Culture Spring. 4 credits.

T 3-5:30. M. Kammen.
A seminar open to graduate students and qualified seniors. Discussions will focus upon the tension between tradition and a democratic ethos in national culture (1840-1920) with particular attention given to their gradual reconciliation in the half century after 1925. Materials to be examined will include high, mass, and popular culture; the changing role of government as a custodian of culture; the uses and abuses of American history for partisan purposes; and the changing reputations of major heroes.

[613-614 Graduate Seminar in American Foreign Relations] W. LaFeber. Not offered 1981-82.]

[615-616 Seminar in American Cultural and Intellectual History] F. Somkin. Not offered 1981-82.]

[617-618 Seminar in Recent American Cultural History] R. L. Moore. Not offered 1981-82.]

[619 Seminar in American Social History] S. Blumin. Not offered 1981-82.]

[626 Graduate Seminar in the History of American Women] Fall. M. B. Norton. Not offered 1981-82.]

627 Graduate Seminar in the History of American Women Spring. 4 credits.

M 2:30-4:30. M. B. Norton.

[633-634 Seminar in Nineteenth-Century American History] J. H. Silbey. Not offered 1981-82.]

710 Colloquium in American History Fall. 4 credits. Required of all first-year American history graduate students.

M 3-5. J. H. Silbey.
Examination of the major themes, epochs, and interpretations of American history.

Asian History

190 Introduction to Asian Civilizations Spring. 4 credits.

T R 11:15; plus an additional hour, M 12:20, 1:25, or 3:35. J. V. Koschmann, C. A. Peterson, and D. K. Wyatt.

An introduction to the distinctive cultures of China, India, Japan, and Southeast Asia 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.

T R 11:15; plus an additional hour, M 12:20, 1:25 or 3:35. S. Cochran and 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] Fall. S. Cochran and M. Young. Not offered 1981-82.]

393 History of China up to Modern Times Fall. 4 credits.

T R 10:10; disc to be arranged. C. A. Peterson.
A broad examination of the major aspects of Chinese culture and civilization from earliest times to the late imperial period. Seeks to expose both those features maintaining continuity and the significant (but frequently overlooked) instances of change.

394 History of China in Modern Times Spring. 4 credits.

T R 10:10; plus an additional hour, R 1:25, 2:30, or 3:35. S. Cochran.

A survey that concentrates on the rise of the last imperial dynasty in the seventeenth and eighteenth centuries, the upheavals resulting from domestic rebellions and foreign imperialism in the nineteenth century, and the twentieth-century efforts to achieve social mobilization and political unity.

395 Indochina and the Archipelago to the Fourteenth Century Fall. 4 credits.

T R 11:15; plus one hour to be arranged.
O. W. Wolters.
A survey of the early history of Indochina and the Archipelago, with particular attention to questions raised in the source material concerning religious beliefs and political and social assumptions.

396 Southeast Asian History from the Fifteenth Century Spring. 4 credits.

W F 12:20; disc M 12:20. 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 10:10. 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 10:10. 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.

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.

W 1:25-3:20. 4 credits. 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, scepticism, 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 the instructor.

Hours to be arranged. C. A. Peterson.
Topic for fall 1981: 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, 394 or permission of instructor.
F 1:25-3:15. 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 Fall. 4 credits. Prerequisite: permission of the instructor.

C. A. Peterson.

693-694 Problems in Modern Chinese History 693, fall; 694, spring. 4 credits each term. Prerequisite: permission of instructor.

Hours to be arranged. S. Cochran.

695-696 The Historiography of Southeast Asia 695, fall; 696, spring. 4 credits each term.

Prerequisite: permission of instructor.
Hours to be arranged. O. W. Wolters and D. K. Wyatt.

791-792 Seminar in Medieval Chinese History 791, fall; 792, spring. 4 credits each term. Prerequisite: permission of instructor.

Hours to be arranged. C. A. Peterson.

793-794 Seminar in Modern Chinese History 793, fall; 794, spring. 4 credits each term. Prerequisite: permission of instructor.

Hours to be arranged. S. Cochran.

795 Seminar in Southeast Asian History Fall. 4 credits.

Hours to be arranged. D. K. Wyatt.
Topic for fall 1981: Literature and history in pre-modern Southeast Asia.

[796 Seminar in Southeast Asian History Spring. D. K. Wyatt. Not offered 1981–82; next offered 1983.]**Ancient European History****265 Ancient Greece from Homer to Alexander the Great** Fall. 4 credits. No prerequisites. Open to freshmen.

M W 11:15; disc to be arranged. B. Strauss.
A survey of Greece from the earliest times to the end of the Classical Period in the late fourth century B.C. The course focuses on the Greek genius: its causes, its greatness, its defects, and its legacy. The Heroic Age, the city-state, ancient democracy, and the intellectual ferment of the Greek Enlightenment are the main topics of study. Readings in translation from Homer, Aeschylus, Sophocles, Herodotus, Thucydides, Plato, Aristotle; and from the evidence of ancient inscriptions, coins, art, and architecture.

[267 The Roman Republic A. H. Bernstein. Not offered 1981–82.]**268 Rome of the Caesars** Spring. 4 credits. Open to freshmen. History 267 not a prerequisite to 268.

W F 10:10; discussion to be arranged.
A. H. Bernstein.
A survey of Roman imperial history from the assassination of Julius Caesar to the collapse of effective governance in the West in the eighth century. Special attention will be paid to the governing methods of the dictatorship; provincial administration; the conflict between paganism and Christianity and the latter's triumph; and the inevitable theme of decline and fall. Readings from Tacitus, Suetonius, the *Historia Augusta*, and Ammianus Marcellinus.

373 The Greek City from Alexander to Augustus, 323 B.C.–A.D. 14 Spring. 4 credits. No prerequisites.

M W 11:15; disc to be arranged. B. Strauss.
A study of the impact of expansion on Greek civilization. The central theme is the change in values as the individual citizen lost his political importance under monarchy and as Hellenism interreacted and fused with Near Eastern civilization in the lands conquered by Alexander. Other topics for examination include the creation of an Eastern Mediterranean economy; the spread of urban life; pastoral ideal and peasant reality; Cynics, Stoics, Skeptics, and Epicureans; Alexandrian literature and science; Hellenism and Jews; and roots of Christianity. Readings in translation include Menander, Theophrastus, Theocritus, Polybius, Archimedes, Lucretius, Cicero, Appian, Plutarch, Ptolemy, the Bible; and the evidence of inscriptions, papyri, art, and architecture.

[452 The Tragedy of Classical Athens, 479–399 B.C.] B. Strauss. Not offered 1981–82.]**453 Crisis of the Greek City-State, 415–301 B.C.** Spring. 4 credits. Enrollment limited. Prerequisite: History 265 or consent of the instructor.

M 2:30–4:20. B. Strauss.
The fortunes of the city-state in an age of uncertainty. The central question of the course is why the Greeks squandered their resources in a century of internecine warfare so that the kings of Macedon eventually conquered them. In attempting an answer, we shall examine the political, material, and intellectual condition of fourth-century Greece. Particular attention will be paid to assessments of Greece's problems in contemporary history, philosophy, oratory, and drama and to developments in religion and art. Readings in translation from

Thucydides, Sophocles, Aristophanes, Xenophon, Isocrates, Demosthenes, Plato, Aristotle, Menander, Plutarch.

[460 Roman Imperialism A. H. Bernstein. Not offered 1981–82.]**[461 The Roman Revolution** A. H. Bernstein. Not offered 1981–82.]**[462 The High Roman Empire** A. H. Bernstein. Not offered 1981–82.]**[463 Decline and Fall of the Roman Empire** A. H. Bernstein. Not offered 1981–82.]**[561 Social and Economic History of Rome, 60 B.C. to A.D. 117** A. H. Bernstein. Not offered 1981–82.]**[562 Roman Africa** A. H. Bernstein. Not offered 1981–82.]**[661 Graduate Seminar in Ancient Classical History** A. H. Bernstein. Not offered 1981–82.]**Medieval, Renaissance, and Early Modern European History****[257 English History from Anglo-Saxon Times to the Revolution of 1688** C. Holmes. Not offered 1981–82.]**263 The Earlier Middle Ages** Spring. 4 credits. M W F 12:20. J. J. John.

A survey of medieval civilization from c. 300 to c. 1100, dealing with religious, intellectual, political, and economic developments in Western Europe.

[264 The High Middle Ages B. Tierney. Not offered 1981–82.]**[349 Greece in Late Antiquity and Early Byzantine Times, A.D. 306–565** B. Strauss. Not offered 1981–82.]**[350 Early Renaissance Europe** J. Najemy. Not offered 1981–82.]**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 W. Kennedy, G. Mazzotta, 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.

364 Introduction to the Culture of the Later Renaissance (also Comparative Literature 362 and History of Art 351) Spring. 4 credits. No prerequisites.

T R 1:25; disc either F 1:25 or F 2:30. E. Dotson, C. Kaske, with C. Arroyo, C. Holmes, P. Lewis, J. Najemy, J. Richards.
Although History 361 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, Montaigne, Edmund Spenser, Bodin, Cervantes, and Galileo. Close reading of texts, literary and visual; discussion will include methods of interpretation and historical analysis. Two lectures and one discussion a week.

365 Medieval Culture, 400–1150 Spring. 4 credits. Prerequisite: History 263 or permission of instructor.

T R 2:30–3:45. J. J. John.

Intellectual and cultural developments in the age of monasticism, from St. Augustine and St. Benedict to St. Anselm and St. Bernard of Clairvaux.

[366 Medieval Culture, 1100–1300 J. J. John. Not offered 1981–82; next offered spring 1983.]**367 Church and State During the Middle Ages** Fall. 4 credits. Prerequisite: History 263 or 264 or permission of instructor. Open to graduate students.

T R 10:10–11:15. 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 B. Tierney. Not offered 1981–82.]**369 The History of Florence in the Time of the Republic 1250–1530** Spring. 4 credits.

M W 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 Spring. 4 credits. Prerequisite: permission of instructor.

M W 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 D. A. Baugh. Not offered 1981–82.]**381–382 Law and Social Change in Early Modern England (Frederick G. Marcham Seminar, also Society for the Humanities 381–382, and Law 755)** 381, fall; 382, spring. 4 credits each term.

Fall: M W 2:30–3:45. Spring: irregular class meetings; students will pursue independent work in consultation with the instructors, and the class will meet for presentations by visiting scholars and members of the class. L. Bonfield, C. Holmes.
An exploration of the relationships between social and political development of England from fifteenth through the eighteenth centuries, and the transformation of the substantive rules of law and the institutional structure for their administration. The class will examine some general theoretical statements concerning the social springs of legal change, then, in the light of these, will engage in a detailed examination of the English legal system in the early modern period, with particular reference to commercial constitutional and property law.

387 History of Spain and Portugal: The Golden Age and After, 1492–1700 Fall. 4 credits.

T R 2:30–3:50. A. C. de C. M. Saunders.
A study of the effects of world empire on the society, economy, and culture of Spain and Portugal and on the Iberian kingdoms' political relations with other European states. Topics considered include the relationship between American treasure and inflation, slavery in the peninsula, the Morisco problem, war in the Netherlands and Germany, the Portuguese and Catalan revolutions and the economic decline of the seventeenth century.

[468 Undergraduate Seminar in Renaissance History J. Najemy. Not offered 1981–82.]**[469 Undergraduate Seminar in Reformation History** J. Najemy. Not offered 1981–82.]

475 Seminar in the English Civil War, 1640–1660 Spring. 4 credits.

Hours to be arranged. 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] C. Holmes. Not offered 1981–82.]**663 Seminar in Renaissance History** Spring. 4 credits. Open to qualified undergraduates with permission of instructor.

Hours to be arranged. J. Najemy.
Research seminar. Topic for 1981–82: Corporatism in European society and politics, 1200–1500, with special attention to the guilds, confraternities, and other corporate associations of the Italian city-states. Students should have a reading knowledge of medieval Latin and of either Italian, French, or German.

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. 4 credits.
Hours to be arranged. J. J. John.**[669 Seminar in Medieval History]** B. Tierney. Not offered 1981–82.]**[670 Seminar in Tudor and Stuart History]** C. Holmes. Not offered 1981–82.]**Modern European History****258 English History from the Revolution of 1688 to the Present** Spring. 4 credits.
M W 2:30–4. D. A. Baugh.

An introductory course encompassing political, economic, imperial, intellectual and religious developments. Readings include selections from Defoe, Burke, Paine, Macaulay, Malthus, Mill, and Keynes.

[352 The End of the Austro-Hungarian Monarchy, 1848–1918] I. V. Hull. Not offered 1981–82; next offered fall 1982.]**353–354 European Intellectual History in the Nineteenth and Twentieth Centuries** 353, fall; 354, spring. 4 credits each term. History 353 is not 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 Fall. 4 credits.
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 which 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 Fall. 4 credits.
M W F 9:05. 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, the struggle for unification, to the beginning of the modern, industrial state.

358 Survey of German History, 1890 to the Present Spring. 4 credits.

T R 9:05; disc W and R 1:25–2:15. I. V. Hull.
The "German problem." Major topics are: tensions caused by rapid industrialization presided over by a preindustrial, political elite; origins of World War I; growth of anti-Semitism; social dislocations of World War I; failure of the socialist revolution of 1918–1919; unstable Weimar democracy and the rise of Nazism; the Nazi state; World War II; the two Germanies.

[362 Russian History to 1800] W. M. Pintner. Not offered 1981–82; next offered fall 1982.]**363 Russian History since 1800** Spring. 4 credits.
T R 10:10–11:25. W. M. Pintner.

The development of the modern Russian state, both before and after the Revolution of 1917. Stress is placed on the Russian experience as the first "undeveloped" country to become a major industrial power.

[372 Social and Cultural History of Contemporary Europe] Spring. J. H. Weiss. Not offered 1981–82.]**[383–384 Europe in the Twentieth Century]** 383, fall; 384, spring. 4 credits each term. History 383 is not a prerequisite to 384. J. Weiss. Not offered 1981–82.]**388 Modern Spain and Portugal, 1700–1975** Spring. 4 credits.

T R 2:30–3:50. A. C. de C. M. Saunders.
A study of the Iberian peninsula in the modern era, emphasizing the vicissitudes of dictatorship and democracy, centralism and federalism. Topics considered include the Borbón reforms in Spain and the Pombaline dictatorship in Portugal; Napoleonic invasions and liberal revolutions; the army in nineteenth-century politics; the first Portuguese republic and Salazar's *Estado Novo*; and the Spanish Civil War and Franco.

450 Seminar in European Imperialism Spring. 4 credits. Open to upper-level undergraduates. Prerequisite: permission of instructor.

T 2:30–4:30. I. V. Hull.
Focuses on the various theories of imperialism with particular reference to the domestic causes, uses, and repercussions of the late nineteenth-century imperialism in Germany, France, and Great Britain.

[451 Lord and Peasant in Europe: A Seminar in Social History] S. L. Kaplan. Not offered 1981–82.]**[456 Seminar in Germany, 1890–1918]** I. V. Hull. Not offered 1981–82; next offered fall 1982.]**457 Seminar in European Fascism** Fall. 4 credits. Prerequisite: permission of instructor.

M 2:30–4:30. 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] I. V. Hull. Not offered 1981–82; next offered spring 1983.]**[459 The Making of the English Ruling Class, 1660–1780]** D. A. Baugh. Not offered 1981–82.]**[467 Seminar in Modern European Political History]** Spring. 4 credits. Prerequisite: History 383 or permission of the instructor. J. H. Weiss. Not offered 1981–82.]**471 Russian Social and Economic History** Spring. 4 credits.

M 2:30–4:30. W. M. Pintner.
A seminar devoted to an examination of the transformation of Russia from a backward agrarian nation to the second of the world's superpowers.

474 Topics in Modern European Intellectual History Spring. 4 credits.
W 1:25–3:25. D. LaCapra.**[476 Documenting the Depression: Film, Literature, and Memory]** Fall. 4 credits. Prerequisite: one course dealing with twentieth-century America, twentieth-century Britain, or film analysis. J. H. Weiss. Not offered 1981–82.]**477 The Politics of the Enlightenment** Spring. 4 credits.

W 2:30–4:30. S. L. Kaplan.
An inquiry into the historical origins of European (especially French) political 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 Bayle, Locke, Montesquieu, Voltaire, Rousseau, Hume, Diderot, Burke, and Paine as well as from modern scholarly and polemical literature.

[478 Seminar in Eighteenth-Century French Social History] S. L. Kaplan. Not offered 1981–82.]**[480 Twentieth Century Britain]** D. A. Baugh. Not offered 1981–82.]**[483 Seminar in Modern European Social History]** J. Weiss. Not offered 1981–82; next offered fall 1982.]**[655 Seminar in Eighteenth-Century British History]** D. A. Baugh. Not offered 1981–82.]**[656 Seminar in Nineteenth-Century British History]** D. A. Baugh. Not offered 1981–82.]**[671 Seminar in the French Revolution]** S. L. Kaplan. Not offered 1981–82.]**672 Seminar in European Intellectual History** Fall. 4 credits.
Hours to be arranged. D. LaCapra.**677 Seminar in Russian History** Spring. 4 credits.
M 2:30–4:30. W. M. Pintner.**[678 Seminar in Modern European Social History]** Spring. 4 credits. J. H. Weiss. Not offered 1981–82.]**[679 Seminar in European History]** S. L. Kaplan. Not offered 1981–82.]

Latin American History

295 Colonial Latin America Fall. 4 credits.

M W F 10:10. T. H. Holloway.
Survey of Latin America from the rise of pre-Columbian civilizations through the European conquest, establishment of the Spanish and Portuguese colonial societies, imperial rivalries in the New World, 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 T. H. Holloway. Not offered 1981–82.]

348 Twentieth-Century Brazil (also Sociology 368) Spring. 4 credits. Prerequisites: two courses in the social sciences.

M W F 1:25. T. H. Holloway, J. Kahl.
A study of the style of development in economy, polity, and society followed by contemporary Brazil, and an analysis of the contradictions that led to the military coup of 1964 and its aftermath. Some comparisons are made with other Latin American countries. Readings in English.

[649 Seminar in Latin American History T. H. Holloway. Not offered 1981–82.]

Honors and Research Courses

301 Supervised Reading Fall or spring. 2 credits. Prerequisite: permission of instructor. Open only to upperclass students.

302 Supervised Research Fall or spring. 3 or 4 credits. Prerequisite: permission of instructor. Open only to upperclass students.

400 Honors Proseminar Fall or spring. 4 credits. For prospective honors candidates who have permission of instructor.

Fall: W 2:30–4:30; D. K. Wyatt. Spring: W 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 Guidance Fall or spring. 4 credits. Prerequisites: History 400 and permission of instructor.

703–704 Supervised Reading 703, fall; 704, spring. 4 credits each term. Prerequisite: permission of instructor. Limited to graduate students.

History of Art

A. Ramage, chairman and director of undergraduate studies; 35 Goldwin Smith Hall, 256–4905.
T. M. Brown, R. G. Calkins, E. G. Dotson, J. V. Falkenheim, R. C. Hobbs, H. P. Kahn, C. Lazzaro, T. W. Leavitt, S. J. O'Connor, A. S. Roe, M. W. Young

The visual arts—painting, sculpture, and architecture—are a principal mode of human expression. Art historians investigate works of art to understand them in their artistic, historic, and cultural contexts. Courses offered by the department cover the mainstream of Western art (classical, medieval, Renaissance, baroque, nineteenth and twentieth

century) and non-Western art, including Oriental and tribal traditions. Art history is an integral part of interdisciplinary programs such as the archaeology concentration, 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 9:05, 11:15, 12:20, 1:25 or T R 10:10–11:25, 12:20–1:35. Spring: M W F 9:05, 10:10, 11:15, 12:20, or T R 10:10–11:25. Staff.
The nature of man-made objects, from tools to cities including such conventional categories as painting, sculpture, and architecture is examined. Students are introduced to the problems of perceiving such objects and articulating the visual experience. The course is organized by media and themes rather than chronology and it is a supplement, not a prerequisite, to art history.

104 How to Look at Works of Art Fall or spring. 3 credits.

Spring: T R 12:20–1:35, J. V. Falkenheim.
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.

[105 Myth and Image in Modern Society (also Sociology 103) 3 credits. Not offered 1981–82.]

106 Art in a Landscape: Traditional Arts in Southeast Asia Fall. 3 credits.

M W F 10:10. S. J. O'Connor.
The traditional arts in Southeast Asia such as textiles, ceramics, architecture, sculpture, and puppet theatre will be examined in varying social and physical contexts. The aim of the course will be to introduce the works themselves and to explore the way they are, or were, implicated in daily life. We will encounter works created in the palaces and monasteries of the centralized kingdoms, as well as those that are part of the village world. Among the topics to be discussed: Wayang theatre, a world of shadows; batik and ikat, the dyer's art; the life of Buddha in Art; stoneware and porcelain ceramics from Thailand, Cambodia, and Vietnam; ritual art in Bali; and the cosmic mountain in architecture. Emphasis will be on writing short papers.

107 Principles of Architecture Fall. 3 credits. M W F 11:15. T. M. Brown.

Through readings, lectures, and discussions, examination of some theoretical and practical aspects of architecture as it affects our lives.

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.

[200 Introduction to Art History: Mediterranean Archaeology (also Classics 200) 3 credits. Not offered 1981–82.]

[206 Introduction to Art History: Rise of Classical Greece (also Classics 206) 3 credits. Not offered 1981–82.]

[210 Introduction to Art History: Beginnings of Civilization (also Classics 210) 3 credits. Not offered 1981–82.]

[215 Introduction to Art History: African Art 3 credits. Not offered 1981–82.]

220 Introduction to Art History: The Classical World (also Classics 220) Fall. 3 credits.

M W F 9:05. A. Ramage.
The sculpture, vase painting, and architecture of the ancient Greeks, from the Geometric period through the Hellenistic and the art of the Romans from the early Republic to the late Empire.

221 Introduction to Art History: Minoan-Mycenaean Art and Archaeology (also Classics 221) Spring. 3 credits.

J. E. Coleman.
See description under Classics.

[230 Introduction to Art History: Monuments of Medieval Art 3 credits. R. G. Calkins. Not offered 1981–82.]

240 Introduction to Art History: The Renaissance Fall. 3 credits.

M W F 10:10, plus one disc, M 2:30 or T 9:05, 10:10, or 11:15. 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 major artistic trends in western Europe during the seventeenth century. The course will consider architecture, sculpture, and painting in Italy during the first half of the century, and the schools of painting of Spain, Flanders, Holland, and France. Emphasis will be on major masters of the period: Annibale Carracci, Caravaggio, Bernini, El Greco, Velazquez, Rubens, Hals, Vermeer, Rembrandt, Poussin.

261 Introduction to Art History: Modern Art Fall. 3 credits.

T R 10:10–11:25. J. V. Falkenheim.

A topical discussion of some of the major artists, movements, and ideas that make up modern art. Emphasis is on European and American painting in relationship to cultural and intellectual concerns of the period spanning approximately 1800 to 1950.

[270 Introduction to Art History: American Art] 3 credits. Not offered 1981–82.]**280 Introduction to Art History: Asian Traditions** Spring. 3 credits.

M W F 10:10. S. J. O'Connor.

Designed to introduce students to the varied responses of the Asian artist in different social and geographical contexts. By selective focus and emphasis, rather than broad survey, the student will gain some familiarity with high-fired ceramics, Chinese landscape painting, Buddhist sculpture and painting of Thailand, Indian miniature paintings, and Japanese prints. A number of class sessions will meet in the Herbert F. Johnson Museum of Art.

290 Introduction to Art History: Architecture and Environment Fall. 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.

Intermediate Courses

The following courses are intended primarily for upperclass students, qualified sophomores, and first-year graduate students. Except as noted, all require as a general prerequisite one course at the 200 level. Some of the courses have discussion sections.

311 Techniques and Materials: Painting Spring. 4 credits. Limited to 30 students.

T R 10:10–12:05. H. P. Kahn.

The techniques of painting in their historical and formal contexts, analytical research of materials and conservation.

[313 Books, Prints, and the Graphic Image] 4 credits. H. P. Kahn. Not offered 1981–82.]**[320 The Archaeology of Classical Greece (also Classics 320)]** 4 credits. A. Ramage. Not offered 1981–82.]**[321 Archaeology of Cyprus (also Classics 321)]** 4 credits. Not offered 1981–82.]**[322 Arts of the Roman Empire (also Classics 350)]** 4 credits. A. Ramage. Not offered 1981–82.]**[323 Painting in the Greek and Roman World (also Classics 323)]** 4 credits. A. Ramage. Not offered 1981–82.]**324 Architecture in the Greek and Roman World (also Classics 324)** 4 credits. Spring.

J. E. Coleman.

See description under classics.

[325 Greek Vase Painting (also Classics 325)] 4 credits. A. Ramage. Not offered 1981–82.]**[326 Art and Archaeology of Archaic Greece (also Classics 326)]** 4 credits. Not offered 1981–82.]**[327 Greek and Roman Coins (also Classics 327)]** 4 credits. A. Ramage. Not offered 1981–82.]**329 Greek Sculpture (also Classics 329)** Spring. 4 credits.

M W F 11:15. A. Ramage.

Study of ancient Greek sculptural techniques and achievements in marble and bronze. Detailed examination of works from several eras to illustrate changes in taste and outlook.

[330 Art in Pompeii: Origins and Echoes (also Classics 330)] 4 credits. Not offered 1981–82.]**332 Architecture in the Middle Ages** Spring. 4 credits.

M W F 11:15. R. G. Calkins.

A survey of Medieval Architecture from the Early Christian Period to the Late Gothic (A.D. 300–1500). Considerable emphasis will be placed on the development of structural systems and upon the form, function, and meaning of important medieval buildings.

[333 Early Medieval Art and Architecture] 4 credits. R. G. Calkins. Not offered 1981–82.]**[334 Romanesque Art and Architecture]** 4 credits. R. G. Calkins. Not offered 1981–82.]**[335 Gothic Art and Architecture]** 4 credits. R. G. Calkins. Not offered 1981–82.]**336 Late Medieval Italian Art and Architecture** Spring. 4 credits.

M W F 1:25. R. G. Calkins.

Thirteenth- and fourteenth-century Italian sculpture, painting, and some architecture, including the works of Duccio, Giotto, and the Lorenzetti.

[337 The Medieval Illuminated Book] 4 credits. R. G. Calkins. Not offered 1981–82.]**[341 Flemish Painting]** 4 credits. R. G. Calkins. Not offered 1981–82.]**[342 Medieval and German Renaissance Art]** 4 credits. R. G. Calkins. Not offered 1981–82.]**[343 Italian Renaissance Art of the Fifteenth Century]** 4 credits. Not offered 1981–82.]**344 Italian Renaissance of the Sixteenth Century** Spring. 4 credits.

M W F 12:20. C. Lazzaro.

Topic for 1981–82: Great Masters of the High Renaissance—Leonardo, Michelangelo, and Raphael.

A thorough examination of the works of these three masters and of their cultural and historical environment. Primary emphasis is on their painting, sculpture, and architecture, but the writings of Leonardo and Michelangelo are also considered.

[345 Sculpture of the Italian Renaissance] 4 credits. Not offered 1981–82.]**350 The Culture of the Early Renaissance (also History 361 and Comparative Literature 361)** Fall. 4 credits. No prerequisites.

T R 1:25–2:15; disc to be arranged. C. Lazzaro and J. Najemy, with W. Kennedy, G. Mazzotta, and 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.

351 Introduction to the Culture of the Later Renaissance (also History 364 and Comparative Literature 362) Spring. 4 credits.

T R 1:25–2:15, plus one disc, F 12:20 or 1:25.

E. G. Dotson and C. Kaske.

Although History of Art 350 (also 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, 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. Guest lecturers will be: C. Arroyo, Spanish; C. Holmes, history; P. Lewis, French; J. Najemy, history; and J. Richards, history.

[352 Dutch Painting in the Seventeenth Century] 4 credits. Not offered 1981–82.]**[355 French Art of the Sixteenth and Seventeenth Centuries]** 4 credits. E. G. Dotson. Not offered 1981–82.]**[357 European Art of the Eighteenth Century]** 4 credits. E. G. Dotson. Not offered 1981–82.]**[359 Major Masters of the Graphic Arts]** 4 credits. H. P. Kahn, A. S. Roe. Not offered 1981–82.]**[361 Modern Artists and Their Critics]** 4 credits. J. V. Falkenheim. Not offered 1981–82.]**362 Topics in Modern Art** Spring. 4 credits. T R 10:10–11:25. J. V. Falkenheim.

Topic to be announced.

[364 Modern Sculpture] 4 credits. R. C. Hobbs. Not offered 1981–82.]**365 Art from 1940 to the Present** Fall. 4 credits. Prerequisite: History of Art 261.

T R 12:20–1:35. R. C. Hobbs.

Major movements and figures working in the United States since 1940, beginning with abstract expressionism and continuing to conceptual and feminist art. Some attention is devoted to the critical reception that artists have received, but major emphasis is on the artists' statements themselves.

[376 Painting and Sculpture in America: 1850–1950] 4 credits. T. W. Leavitt. Not offered 1981–82.]**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," "cities: source of virtue or vice?" Extensive reading will be required from works of Jefferson, Thoreau, Greenough, Sullivan, Henry Adams, Whitman, Wright, and from such secondary sources as Leo Marx's *The Machine in the Garden* and M. and L. White's *The Intellectual Versus the City*.

[379 Art and Technology: 1850–1950] 4 credits. T. M. Brown. Not offered 1981–82.]**380 Introduction to the Arts of China** Fall. 4 credits. Not open to students who have had History of Art 383 or 385.

M W 12:20, plus one disc, T 9:05, 11:15, 1:25, or 3:35. M. W. Young.

A one-semester course designed for those students who have 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 early bronze vessels to later landscape paintings. Special emphasis will be put on the art of the later centuries, and the course will end with a discussion of changes going on in modern China. The collection of the Herbert F. Johnson Museum of Art will be used in conjunction with the discussion sections.

[381 Buddhist Art in Asia] 4 credits.
S. J. O'Connor. Not offered 1981-82.]

[383 The Arts of Early China] 4 credits.
M. W. Young. Not offered 1981-82.]

384 The Arts of Japan Spring. 4 credits.
M W 12:20. M. W. Young.

An introduction to the visual arts of Japan. Although a general chronological pattern is followed, the arts are approached topically, with emphasis on the developments of the recent centuries. Painting, woodblock prints, and the minor arts of the Meiji era receive particular attention. Term paper option for the final exam.

[385 Chinese Painting] 4 credits. M. W. Young. Not offered 1981-82.]

[386 Studies in Indian and Southeast Asian Art] 4 credits. S. J. O'Connor. Not offered 1981-82.]

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 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. 4 credits; may be repeated for credit. Prerequisite: permission of a department faculty member.
Hours to be arranged. Staff.
Individual investigation and discussion of special topics not covered in the regular course offerings, by arrangement with a member of the department.

[405 Original Works of Art] 4 credits. Not offered 1981-82.]

[406 Introduction to Museums] 2 credits.
T. W. Leavitt. Not offered 1981-82.]

421 History of Art Criticism Fall. 4 credits.
R 2:30-3:45. J. V. Falkenheim.
Topic for 1981: Formalism. A consideration of the ideas of selected nineteenth- and twentieth-century theorists and critics responsible for generating a formalist approach to art, followed by an evaluation of the writings of various later twentieth-century critics who have subscribed to this method of critical analysis.

[423 Ceramics] 4 credits. Prerequisite: permission of instructor. A. Ramage. Not offered 1981-82.]

[431 Greek Sculpture (also Classics 431)] 4 credits. A. Ramage. Not offered 1981-82.]

[448 Mannerism and the Early Baroque Era in Italy] 4 credits. E. G. Dotson. Not offered 1981-82.]

449 Studies in Italian Renaissance Art Fall. 4 credits.
M 2:30-4:25. C. Lazzaro.
Topic for 1981-82: The Italian Renaissance villa as a cultural and art historical phenomenon. Within the context of contemporary ideas about nature and life in the country, the style and content considered appropriate for the design and decoration of the villa and of its accompanying gardens are examined. Focus on the principal villas of Tuscany, Latium, and the Veneto in the fifteenth and sixteenth centuries.

[452 Studies in English Art] 4 credits. A. S. Roe. Not offered 1981-82.]

[456 Literature and the Arts in Sixteenth-Century France (also French 456)] 4 credits. E. G. Dotson, E. P. Morris. Not offered 1981-82.]

458 Classic and Romantic Art Spring. 4 credits.
W 2:30-4:25. E. G. Dotson.
Topic for 1982: Studies in eighteenth-century English art and culture.

459 The Romantic Movement in Poetry, Painting, and Graphic Arts (also English 442) Spring. 4 credits.
T R 1:25-2:40. J. Visconti.
See description under English.

[464 Studies in Modern Art] 4 credits.
J. V. Falkenheim. Not offered 1981-82.]

465 Problems in Modern Art and Architecture Spring. 4 credits. Limited to 15 students. Prerequisite: permission of instructor.
M 12:20-2:15. T. M. Brown.
Topics to be announced.

[474 American and European Decorative Arts from the Renaissance Period to the Early Nineteenth Century] 4 credits. Prerequisite: permission of instructor. Not offered 1981-82.]

475 The Earliest Arts in Colonial America: The Seventeenth Century Fall. 4 credits.
T R 12:20-1:35. A. S. Roe.
An amplification of History of Art 474, this course will deal only with the arts in New England and the Hudson River Valley prior to 1700. Under consideration will be the earliest objects surviving which were demonstrably produced in the Colonies during this period, and also those types of objects produced in England and elsewhere which are known to have been imported in significant quantities from the earliest times. The traditions of craftsmanship prevailing in Europe at the time of the arrival of the first settlers in New England will be studied as indicative of the stylistic origins which determined the form and decoration of the earliest objects produced in America. In addition to furniture, particular emphasis will be placed upon the art of the silversmith, the first highly sophisticated European craft to be developed in the New World, and important not only as the art form which most rapidly transmitted to America the latest stylistic developments in the arts of Europe, but also for its economic significance in the days when silver was the major medium of exchange, and the silversmith performed many of the functions today associated with the banker. The early importation of ceramics, both high style and utilitarian, will also be considered.

[476 Seminar on American Art: 1840-1940] 4 credits.
T. W. Leavitt. Not offered 1981-82.]

481 The Arts in Modern China Fall. 4 credits.
Prerequisite: History of Art 385, or a course in modern Chinese history or literature and permission of the instructor.
M 2:30-4:25. M. W. Young.
An examination of major issues in Chinese art of the late Imperial and modern periods, with special

emphasis on developments in the art of painting. The course will be conducted as a seminar, with discussions, reports, and a major paper expected.

[482 Ceramic Art of Asia] 4 credits.
S. J. O'Connor. Not offered 1981-82.]

[483 Chinese Art of the T'ang Dynasty] 4 credits.
Prerequisites: History of Art 380 or 383, or a course in Chinese history or Chinese literature, or permission of instructor. M. W. Young. Not offered 1981-82.]

[486 Studies in Chinese Painting] 4 credits.
M. W. Young. Not offered 1981-82.]

[488 Traditional Arts in Southeast Asia] 4 credits.
S. J. O'Connor. Not offered 1981-82.]

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 Fall. 4 credits.
R 3-5. A. Ramage and F. Ahl.
Art, literature, and life in the Roman world from Nero's death to the mid-second century A.D.

[531 Problems in Medieval Art and Architecture] 4 credits. R. G. Calkins. Not offered 1981-82.]

[540 Seminar in Renaissance Art] 4 credits. Not offered 1981-82.]

[550 Seminar in Baroque Art] 4 credits.
C. Lazzaro. Not offered 1981-82.]

564 Problems in Modern Art: Post-1940 American Art Spring. 4 credits.
T 2:30-4:30. R. C. Hobbs.
An investigation of major works of art that reveal distinct changes in artistic thinking. Movements covered will include: abstract expressionism, happenings, pop art, minimalism, conceptual art, earth art, body art, and feminist art.

[580 Problems in Asian Art] 4 credits.
S. J. O'Connor. Not offered 1981-82.]

591-592 Supervised Reading 591, fall; 592, spring. 4 credits; may be repeated for credit. Limited to graduate students.

[594 Methodology Seminar I] 4 credits. Not offered 1981-82.]

[595 Methodology Seminar II] 4 credits. Required of all graduate students. Prerequisite: permission of instructor. S-U grades only. R. C. Hobbs. Not offered 1981-82.]

[596 Problems of Art Criticism] 4 credits.
S. J. O'Connor. Not offered 1981-82.]

Related Courses in Other Departments

Renaissance Spectating: Audience as Artifice (Society for the Humanities 413-414)

The Role of Literature as Presented in Post-1949 Chinese Writing (Society for the Humanities 417)

Conventions of Expression in Renaissance Art (Society for the Humanities 419)

Themes from Russian Culture (Russian Literature 307)

Indonesian

See Modern Languages, Literatures, and Linguistics, p. 140.

FALCON Program: J. U. Wolff; 307 Morrill Hall, 256-4864

Italian

See Modern Languages, Literatures and Linguistics, p. 147, and Romance Studies, p. 173.

Japanese

See Asian Studies, p. 98, and Modern Languages, Literatures, and Linguistics, p. 140.

FALCON Program: E. Jorden; 321 Morrill Hall, 256-6457

Javanese

See Modern Languages, Literatures, and Linguistics, p. 140.

Latin

See Classics, p. 106.

Linguistics

J. W. Gair, director of undergraduate studies; 407 Morrill Hall, 256-5110

See Modern Languages, Literatures, and Linguistics, p. 140.

Mathematics

S. Lichtenbaum, chairman; J. Bramble, associate chairman and director of undergraduate studies, 301 White Hall, 256-4185. I. Bernstein, L. Billera, K. Brown, L. Brown, S. Chase, M. Cohen, R. Connelly, R. Dennis, E. Dynkin, C. Earle, R. Farrell, P. Fejer, M. Fisher, W. Fuchs, S. Gelbart, L. Gross, R. Hamilton, D. Henderson, J. Hubbard, J. Hwang, P. Kahn, H. Kesten, A. Knapp, G. Livesay, M. Morley, A. Nerode, L. Payne, R. Platek, A. Rosenberg, O. Rothaus, A. Schatz, S. Sen, R. Shore, B. Speh, F. Spitzer, M. Steinberger, R. Strichartz, M. Sweedler, L. Wahlbin, J. West, A. C. Zitronbaum

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 and 2 indicate underclass courses; 3 and 4, upperclass courses; 5 and 6, graduate courses. The subject matter of courses is indicated by the second digit: 0, general; 1 and 2, analysis; 3 and 4, algebra; 5 and 6, topology and geometry; 7, probability and statistics; 8, logic; 9, other.

Mid-term 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 a CEEB 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.

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.

The prerequisites and requirements below apply to students who enroll in the mathematics major after January 1, 1981. Students who enrolled before that date may fulfill either the requirements below or the old requirements.

Prerequisites: The preferred prerequisites are Mathematics 221-222 or 293-294. 217 is necessary if neither 122 nor 293 has been taken. (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. Alternate prerequisites are 214-215-216-217-231, normally with grades of B+ or better.

Requirements

- 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 431 or 433, 432 or 434 or 332, 336.
- 3) Two courses in analysis. Eligible courses are 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 or 622 or both may also be used toward satisfying this requirement.

- b) four Computer Science courses numbered 314 or higher.
 - c) four Operations Research 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 221-222 are more suitable than 293-294 in this case. A student planning to enter graduate school may get by with 411-412 and 431-432 instead of the honors versions 413-414 and 433-434, but the honors versions are strongly recommended.

For Many Technical Careers

First two years: Mathematics 111-122-221-222 or 191-192-293-294, Computer Science 100-211, Physics 112-213 or 207-208.
Last two years: Mathematics 431-336, 421-422, 428, 471-472.

Two or more semesters of computer science are highly recommended.

For Emphasis on Computer Science

First two years: Mathematics 111-122-221-222, Computer Science 100-211.
Last two years: Mathematics 431-432, 421-422; Computer Science 314, 321, 410, 414, 481.

Requirement 5 is met by Computer Science 481 in this sample program. Students interested in computer science should give consideration to a double major in mathematics and computer science.

For Emphasis on Operations Research

First two years: Mathematics 111-122-221-222 or 191-192-293-294, Computer Science 100-211.
Last two years: Mathematics 431-432, 421-422, 471. Operations Research: 320, 321, 361; two of 431, 432, 435; and possibly 462 or 471.

For Pre-law or Pre-medical Study (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 221-222 are recommended rather than 293-294 in this sample program because they provide better preparation for 411.

For Pre-law or Pre-medical Study (second example) or Pre-business Study

First two years: Mathematics 111-112-214-215-216-217-231, 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 100, 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 on the CEEB calculus BC examination. Mathematics 109 or ALS 115 (College of Agriculture and Life Sciences) do not satisfy the requirement.

Basic Sequences

Precalculus

Description	Course Numbers
1) Algebra and trigonometry to prepare students for calculus.	Mathematics 109* or Agriculture and Life Sciences 5*.
2) Algebra, analytic geometry, elements of calculus.	Agriculture and Life Sciences 115**.

*Mathematics 109 and ALS 5 do not carry credit for graduation.

**Students who want a second semester of mathematics after ALS 115 may take Mathematics 107 or 105 or, if they need more calculus, 111 or 113. They may not, however, receive credit for both ALS 115 and Mathematics 108.

Calculus

Description	Mathematics Course Numbers
1) Standard 3-semester sequence for students who do not expect to take advanced courses in mathematics.	111 (or 113) 112–214–215–216–217
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

191 (or 193) may be substituted for 111 (or 113) in sequences 1 and 2. 113 and 193 are variants of 111 and 191 for students who have had some calculus in high school but have not received advanced placement. Sequences 2 and 3 are two-year sequences that include some linear algebra. Students who take sequence 1 may learn some linear algebra by taking Mathematics 231. A student whose performance in 112 is exceptional may switch to sequence 2 and take 221, but 217 must then be taken concurrently.

Special Purpose Sequences

Description	Mathematics Course Numbers
1) Finite mathematics and calculus for biology majors.	105–106
2) Finite mathematics and calculus for students in the more descriptive areas of the social sciences. (This is normally a 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 106 with 112 or 122, or, in exceptional circumstances (with consent of the instructor), with 214–217. 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.

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	221 and 216
112, 122, and 192	216 and 192
214 and 293	217 and 122
216 and 294	221, 294, and 231
217 and 293	372 and 472
221 and 214	

Basic Sequences

103 Mathematics for Architects (also Architecture 221)

Fall. 3 credits.
Lec, T 10:10; 2 recs to be arranged.
Rudiments of calculus and introduction to vectors and matrices.

105 Finite Mathematics for Biologists (also Engineering T&AM 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. 1, Oct. 29, Dec. 3.
Mathematical modelling, sets, functions, and graphing (including use of log and semi-log paper). Probability (with some applications to genetics). Vectors and matrices, Markov chains. Examples from biology are used.

106 Calculus for Biologists (also Engineering T&AM 106)

Spring. 3 credits. Prerequisite: Mathematics 105 or Mathematics 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 Mathematics 112.
Lecs, T R 11:15, plus 2 hours to be arranged.
Prelims: 7:30 p.m. Feb. 18, Mar. 18, Apr. 22.
Introduction to differential and integral calculus, partial derivatives, elementary differential equations. Examples from biology are used.

107 Finite Mathematics

Fall. 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. Oct. 1, Oct. 29, Dec. 3.
Functions, enumeration, permutations and combinations, probability, vectors and matrices, Markov chains.

108 Introduction to Calculus

Spring. 3 credits.
Intended primarily for students in the more descriptive areas of the social sciences. Prerequisite: three years of high school mathematics including

trigonometry and analytic geometry of the line and circle. Recommended: Mathematics 107. This course does not normally provide adequate preparation for any higher course in mathematics; nor can it be used toward fulfillment of the mathematics requirement for biology majors.*

Lecs, T R 12:20 plus 2 hours to be arranged.

Prelims: 7:30 p.m. Feb. 18, Mar. 18, Apr. 22.

Behavior of functions, introduction to differential and integral calculus, elementary differential equations.

109 Precalculus Mathematics

Fall. 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 or spring. 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 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. Sept. 29, Oct. 27, Dec. 8; spring, 7:30 p.m. Feb. 16, Mar. 16, Apr. 20.

Plane analytic geometry, differentiation and integration of algebraic and trigonometric functions, applications of differentiation, logarithmic and exponential functions.

112 Calculus

Fall or spring. 4 credits.
Prerequisites: Mathematics 106 or 111 or 113 with a grade of C or better, or exceptional performance in Mathematics 108. Those who do extremely well in Mathematics 111 or 113 should take 122 instead of 112, unless they plan to continue with Mathematics 214–217.*

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. Sept. 29, Oct. 27, Dec. 8; spring, 7:30 p.m. Feb. 16, Mar. 16, Apr. 20.

Applications of integration, techniques of integration, partial derivatives and external problems, multiple integrals.

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. Sept. 29, Oct. 27, Dec. 8.

122 Calculus

Fall or spring. 4 credits. Prerequisite: performance at a high level in Mathematics 111 or 113 or permission of the department. Students planning to continue with Mathematics 214–217 are advised to take 112 instead of this course.*

Fall: M W F 10:10, 11:15, or 12:20. Spring: M W F 9:05 or 10:10.
Differentiation and integration of elementary transcendental functions, the techniques of integration, applications, polar coordinates, infinite series, and complex numbers, as well as an introduction to proving theorems. The approach is more theoretical than in Mathematics 112.

191–193 Calculus for Engineers

Fall. 4 credits.

Prerequisite: three years of high school mathematics, including trigonometry. Mathematics 193 is a course parallel to 191 for students who have had a substantial amount of calculus in high school, but

*See the list of courses with overlapping content at the end of the introduction.

who did not place out of 191. Although the same topics will be covered in 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. Sept. 29, Oct. 27, Dec. 8.

Plane analytic geometry, differential and integral calculus, and applications.

192 Calculus for Engineers Fall or spring. 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. Sept. 29, Oct. 27, Dec. 8; spring, 7:30 p.m. Feb. 16, Mar. 16, Apr. 20.

Transcendental functions, technique of integration and multiple integrals, vector calculus, analytic geometry in space, partial differentiation, applications.

214–215–216–217 Fall or spring: 1 credit each. Prerequisite: Mathematics 112 or 122. These courses are taught as a unified third-semester calculus package, but students may register for any subset of these courses in accordance with their interests and needs *subject to the credit regulations explained at the end of the introduction*. Students in doubt about their choices should consult their advisers and the course instructors. The courses are offered in sequence (though not necessarily in numerical order) through the semester, and each lasts three to four weeks. The expected order is Mathematics 216, 217, 214, 215, but some variation is possible. (Note: 217 is prerequisite to 214 and 215.)

Lecs, M W F 10:10, plus 2 hours to be arranged. All students should attend the first lecture of the semester to learn the order in which the course will be taught, the dates for each course, the examination dates, and the structure of the whole. Prelims will be given some evenings at 7:30 p.m.

214 Introduction to Differential Equations

Prerequisite: Mathematics 217 or equivalent material from Mathematics 122.

Simple first- and second-order equations with applications; series solutions. See also the entire 214–215–216–217 description above.

215 Differential Equations (continued)

Prerequisites: Mathematics 214 and 217 or equivalent material from Mathematics 122 or 293. Introduction to numerical methods of solution, systems of differential equations, elementary partial differential equations, and boundary value problems. Applications. See also the entire 214–215–216–217 description above.

216 Vector Analysis

Vectors, vector valued functions. Line integrals. See also the entire 214–215–216–217 description above.

217 Infinite Series and Complex Numbers

See the entire 214–215–216–217 description above.

221 Linear Algebra and Calculus Fall or spring. 4 credits. Prerequisite: Mathematics 122 with a grade of B or better, or permission of instructor. Students who obtain permission to use Mathematics 112 as prerequisite should take Mathematics 217 and 221 concurrently.*

Fall: M W F 9:05, 10:10, or 11:15. Spring M W F 10:10 or 11:15.

Linear algebra and differential equations. Topics include vector algebra, linear transformations, matrices, linear differential equations, as well as an introduction to proving theorems.

222 Calculus Fall or spring. 4 credits. Prerequisite: Mathematics 221.

Fall, M W F 11:15 or 12:20; spring, M W F 9:05 or 10:10 or 11:15.

Vector differential calculus, calculus of functions of several variables, multiple integrals.

293 Engineering Mathematics Fall or spring.

3 credits. Prerequisites: Mathematics 192 or 194 plus a knowledge of computer programming equivalent to that taught in Engineering DBS 105. In exceptional circumstances, Mathematics 192 and 293 may be taken concurrently.*

Fall: lecs, M W 10:10, 11:15, or 12:20, plus an hour to be arranged. Spring: lecs, M W 10:10 or 12:20, plus an hour to be arranged. Prelims: fall, 7:30 p.m. Oct. 6, Nov. 5, Dec. 8; spring, 7:30 p.m. Feb. 25, Mar. 23, Apr. 27.

Infinite series, complex numbers, first and second order ordinary differential equations with applications in the physical and engineering sciences.

294 Engineering Mathematics Fall or spring.

4 credits. Prerequisite: Mathematics 293.*

Fall: lecs, M W F 10:10 or 12:20, plus an hour to be arranged. Spring: lecs, M W F 10:10, 11:15, or 12:20, plus an hour to be arranged. Prelims: fall, 7:30 p.m. Oct. 6, Nov. 5, Dec. 8; spring, 7:30 p.m. Feb. 25, Mar. 23, Apr. 27.

Vector spaces and linear algebra, matrices, eigenvalue problems and applications to systems of linear differential equations. Vector calculus. Boundary value problems and introduction to Fourier series.

General Courses

Students who want a general introductory mathematics course are advised to take Mathematics 107–108, described above.

[100 History of Mathematics Spring. 3 credits.

Intended for freshmen and sophomores. Limited to 50 students. Prerequisite: high school geometry. If this course is taken to satisfy part of the distribution requirement, it is to be treated in the same way as Mathematics 403 (consult the distribution requirement section at the beginning of the College of Arts and Sciences section). Not offered 1981–82.]

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.

T R 10:10–11:25.

Topics in mathematics from antiquity to the present.

[408 Development of Modern Mathematical Thought Spring. 4 credits.

Limited to students who are completing a major in mathematics or in a related subject with a strong concentration in mathematics. Prerequisites: Mathematics 411 or 421, and 431 or 231. Not offered 1981–82.

Selected topics tracing the development of mathematics from antiquity to the present (including harmonic analysis and music, calculus, foundations, and modern physics), chosen to shed light on general questions such as: What is mathematics? How does it develop? How does it relate to other areas of knowledge? Students will be expected to write expository papers.]

690 Supervised Reading and Research Variable credit (up to 6 credits each term).

Applied Mathematics and Differential Equations

[305 Mathematics in the Real World Not offered 1981–82. See Engineering OR&IE 431.]

421 Applicable Mathematics Fall or spring.

4 credits. Prerequisites: high level of performance in Mathematics 294, or 217 and 222, or 214–217 and 231. Graduate students who need mathematics extensively in their work and who have had a solid

advanced calculus course and complex variables course as undergraduates should take Mathematics 515–516. With less preparation, they should take Mathematics 421–422–423. Students who have not had infinite series, some linear algebra, and some ordinary differential equations should take Mathematics 214–217, 231, and then 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 Spring. 4 credits.

Prerequisite: Mathematics 421.

T W R F 12:20. Evening prelims may be scheduled. Complex variables. Generalized functions. Fourier transforms, Laplace transforms. Partial differential equations.

423 Applicable Mathematics Fall. 4 credits.

Prerequisite: Mathematics 421; however, students who have not taken 422 should talk to the instructor before taking this course.

T W R F 12:20.

Normed vector spaces. Elementary Hilbert space theory. Projections. Fredholm's alternative. Eigenfunction expansions. Applications to elliptic partial differential equations, and to integral equations.

425 Numerical Solutions of Differential Equations Spring. 4 credits.

Prerequisites: Mathematics 222 or 294, one course numbered 300 or higher in mathematics, and Computer Science 321, or consent of the instructor. This course is a natural sequel to Computer Science 321.

M W F 11:15.

Methods and basic theory for the numerical solution of ordinary and partial differential equations. Linear multistep methods, Runge-Kutta methods, and the problem of stiffness for ordinary differential equations. Finite difference methods and Galerkin finite element methods for partial differential equations. Homework will involve use of a computer.

[427 Introduction to Ordinary Differential Equations Fall. 4 credits.

Prerequisite: Mathematics 222 or 294, or permission of instructor. Offered alternate years. Not offered 1981–82.

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, characteristics. Laplace, heat and wave equations with emphasis on maximum principles, existence, uniqueness, stability. Fourier series methods, approximation methods.

Analysis

311 Elementary Analysis Fall. 4 credits.

Prerequisites: Mathematics 214–217. The material of mathematics 311 is similar to that of 411 below, but is taught at a more elementary level and at a slower pace. A student may not receive credit for both Mathematics 311 and 411 or 413. Will not be offered after 1981–82.

M W F 9:05.

A careful study of topology of the real line. Continuous functions of one real variable. Differentiation and integration of such functions.

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 413, and 413 proceeds at a faster pace than 411. The second semester includes an introduction to the Lebesgue integral.

418 Introduction to the Theory of Functions of One Complex Variable Spring. 4 credits. Prerequisite: Mathematics 222 or 294 or 214–217. May be offered only in alternate years.

A rigorous introduction to complex variable theory. Complex numbers. Differential and integral calculus for functions of a complex variable including Cauchy's theorem and the calculus of residues. Elements of conformal mapping.

Algebra

231 Linear Algebra Spring. 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 Spring only (will be offered only in the fall starting in 1982–83). 4 credits. Prerequisite: one year of calculus. (Also one course from 221, 231, and 294, effective 1982–83.) Mathematics 332 does not satisfy prerequisites for courses numbered 500 and above.

M W F 12:20 (1982–83); 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 217 and 231.

M W F 9:05.
An introduction to concepts and methods of abstract algebra that are of importance in science and engineering. Applications of the theory to concrete problems will be stressed. Each year the course will treat aspects of the following topics: partially ordered sets, lattices, graph theory, and Boolean algebras; finite machines and languages; applications of groups, fields, and modular arithmetic, such as Latin squares, elementary coding theory, or fast Fourier transform; difference equations. Additional topics may be chosen by the instructor.

431–432 Introduction to Algebra 431, fall; 432, spring. 4 credits each. Prerequisite: Mathematics 221 or 231. Undergraduates who plan to attend graduate school in mathematics should take 433–434.

M W F 10:10.
431: An introduction to linear algebra, including the study of vector spaces, linear transformations, matrices, and systems of linear equations; quadratic forms and inner product spaces; canonical forms for various classes of matrices and linear

transformations; determinants.

432: An introduction to various topics in abstract algebra, including groups, rings, fields, factorization of polynomials and integers, congruences, and the structure of finitely generated modules over Euclidean domains with application to canonical forms of matrices.

433–434 Introduction to Algebra 433, fall; 434, spring. 4 credits each. Prerequisite: Mathematics 221 or 231.

M W F 10:10.
Honors version of 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; 452, spring. 4 credits each term. Prerequisite: 221 or 231 or permission of instructor. Mathematics 452 may be offered only in alternate years.

M W F 11:15.
Foundations of geometry. Various geometric topics, including Euclidean, non-Euclidean, and projective geometry and rigidity theory.

453 Introduction to Topology Fall. 4 credits. Prerequisites: Mathematics 411 and 221, or permission of instructor.

M W F 12:20.
Basic point set topology, connectedness, compactness, metric spaces, fundamental group. Application of these concepts to surfaces such as the torus, the Klein bottle, the Moebius band.

454 Introduction to Differential Geometry Spring. 4 credits. Prerequisite: Mathematics 222 or 294. (Mathematics 453 is not a prerequisite.)

M W F 12:20.
Differential geometry of curves and surfaces. Curvature, geodesics, differential forms. Introduction to n -dimensional Riemannian manifolds. This material provides some background for the study of general relativity; connections with the latter will be indicated.

Probability and Statistics

372 Elementary Statistics Spring. 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. Prelims: 7:30 p.m. Feb. 18, Mar. 18, Apr. 22.

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. Prelims: 7:30 p.m. Oct. 1, Oct. 29, Dec. 3.

Topics covered include combinations, important probability laws, expectations, moments, moment-generating functions, limit theorems. Emphasis is on diverse applications and on development of use in statistical applications. See also the description of Mathematics 571.

472 Statistics Spring. 4 credits. Prerequisite: Mathematics 471 and knowledge of linear algebra such as taught in Mathematics 221.*

M W F 11:15. Prelims: 7:30 p.m. Feb. 18, Mar. 18, Apr. 22.

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. (For corresponding subject matter taught in more detail, see description of Mathematics 573 and 675.)

M W F 9:05.
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.

Mathematical Logic

381 Elementary Mathematical Logic Spring. 4 credits. Prerequisite: Mathematics 122.

M W F 11:15.
Propositional and predicate logic. Completeness and incompleteness theorems. Set theory.

Graduate Courses

Students interested in taking graduate courses in mathematics should consult the department for further course details, times, and possible changes in courses as described below.

511–512 Real and Complex Analysis First term: measure and integration, functional analysis. Second term: complex analysis, Fourier analysis, and distribution theory.

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 12:20.
Topics designed to give a working knowledge of the principal mathematical methods used in advanced physics. A brief discussion of some basic notions: metric space, vector space, linearity, continuity, integration. Generalized functions (Schwartz distributions). Fourier series and Fourier integrals. Saddle point method. Linear operators. Differential operators and integral operators, the equations and eigenvalue problems connected with them and the special functions arising from them. Elements of group theory. The rotation group and its representations.

517–518 Ordinary Differential Equations Basic theory of ordinary differential equations.

[519–520 Partial Differential Equations Not offered 1981–82.]

521 Elementary Functional Analysis Elementary set theory and topology, Banach and Hilbert spaces, measure and integration. Graduate students in mathematics should take Mathematics 613 for functional analysis.

522 Applied Functional Analysis Spectral theorem for bounded operators, spectral theory for unbounded operators in Hilbert space, compact operators, distributions. Applications.

527 Analysis of Numerical Methods for Partial Differential Equations

Tools for analyzing practical numerical methods, especially with regard to asymptotic convergence. Finite difference and finite element method.

531-532 Algebra

531: finite groups, field extensions, Galois theory, rings and algebras, tensor and exterior algebra. 532: Wedderburn structure theorem, Brauer group, group cohomology, Ext, Dedekind domains, primary decomposition, Hilbert basis theorem, local rings. Additional topics selected by instructor.

537 Elementary Number Theory Prerequisites: Mathematics 432 and 412.

Introduction to number theory suitable for first-year graduate students and advanced undergraduates. Choice of topics discussed depends on the instructor. In previous years the text has been *A Course in Arithmetic* by J. P. Serre; the topics covered have included quadratic forms, quadratic reciprocity, and modular forms.

549-550 Lie Groups and Differential Geometry.**551 Introductory Algebraic Topology**

Fundamental group and covering spaces. Homology and cohomology theories for complexes and spaces.

552 Differentiable Manifolds Prerequisites:

advanced calculus and knowledge of what a manifold is. The first portion of this course is a rapid introduction to differential geometry. Topics covered include tangent spaces, differential forms, bundles, Lie groups, metrics, connections, curvature, parallel translation, submanifolds, geodesics, exponential map, conjugate points, and Jacobi fields. The second portion will concentrate on several more advanced topics, chosen, for example, from among the following: minimal submanifolds, symplectic structures, complex manifolds, characteristic classes, relations with topology, positive and negative curvature, Yang-Mills, rigidity, general relativity, symmetric spaces, equivariant geometry, or the spectrum of the Laplacian.

[561 Geometric Topology Not offered 1981-82.

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 This course is

a prerequisite to all advanced courses in statistics. First term: same as Mathematics 571. Second term (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 Not offered 1981-82.

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

[577 Nonparametric Statistics Prerequisite: a course in mathematical statistics such as Mathematics 574. Not offered 1981-82. A study of nonparametric techniques, especially order statistics, rank order statistics, scores, local optimality properties, and perhaps some asymptotic theory.]

581 Logic

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**

Topological vector spaces. Banach and Hilbert spaces, Banach algebras. Additional topics to be selected by instructor.

615 Fourier Analysis**[622 Riemann Surfaces** Not offered 1981-82.]**[623 Several Complex Variables** Not offered 1981-82.]**627 Seminar in Partial Differential Equations****631-632 Seminar in Algebra**

[635 Topics in Algebra I Not offered 1981-82. Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.]

[637 Algebraic Number Theory Not offered 1981-82.]

[639 Topics in Algebra II Not offered 1981-82. Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.]

640 Homological Algebra**651-652 Seminar in Topology****653-654 Algebraic Topology**

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 1981-82.]**667 Algebraic Geometry****670 Topics in Statistics**

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 1981-82.]**[675-676 Statistical Decision Theory** Not offered 1981-82.]**677-678 Stochastic Processes****681-682 Seminar in Logic****[683 Model Theory** Not offered 1981-82.]**684 Recursion Theory**

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

Topics in metamathematics. Course content varies.

687 Set Theory

Models of set theory. Theorems of Gödel and Cohen, recent independence results.

690 Supervised Reading and Research

Modern Languages and Linguistics

R. L. Leed, chairman. 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 structures of language, or because they are interested in the area in which the language is spoken. Some people have the notion that a single year of an "exotic" language is not worthwhile, but that has not been the experience for students here. Students who wish to gain fluency in a year will be interested in the Full-Year Asian Language Concentration (FALCON), a program that is unique among the offerings of American universities and has demonstrated the efficacy of intensive work in Chinese, Japanese, and Indonesian.

See Modern Languages, Literatures, and Linguistics, below.

Modern Languages, Literatures, and Linguistics

Courses in modern languages, literatures, and linguistics are offered by various departments of the college. Most courses in modern languages and linguistics are offered by the Department of Modern Languages and Linguistics. Language, literary, and cultural courses are also offered by the following departments:

Language	Department
Akkadian, Arabic, Aramaic	Near Eastern Studies
Chinese literature	Asian Studies
French literature	Romance Studies
Germanic literature	German Literature
Greek	Classics
Hebrew	Near Eastern Studies
Italian literature	Romance Studies
Japanese literature	Asian Studies
Latin	Classics
Russian literature	Russian literature
Spanish literature	Romance Studies
Swahili	Africana Studies and Research Center

Arabic

See Department of Near Eastern Studies.

Burmese

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Burmese 102: 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 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 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

101–102 Elementary Course 101 fall; 102, spring. 6 credits each term. Prerequisite for 102: 101 or equivalent.

Hours 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 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 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 302, Cambodian 301.

Hours to be arranged. F. E. Huffman.

401–402 Directed Individual Study 401, fall; 402, spring. 4 credits each term. For advanced students. Prerequisite: permission of instructor.

Hours to be arranged. F. E. Huffman.

404 Structure of Cambodian Spring only. 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: 101 or equivalent.

Hours to be arranged. J. U. Wolff.
A semi-intensive course for beginners.

Chinese

Languages and Linguistics

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Chinese 102: 101 or equivalent.

Lecs, M W F 9:05; drill, M–F 8 or 2:30. C. Ross, 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 Basic Course 111, fall; 112, spring. 6 credits each term. Prerequisite: permission of instructor.

Lecs, T R 11:15; drill, M–F 10:10. J. McCoy, S. Fessler.
Conversation in standard Cantonese and readings in modern expository Chinese 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.

203–204 Chinese Conversation 203, fall; 204, spring. 1 credit each term; may be repeated for credit. Prerequisite: Chinese 101–102. S–U grades only.

Two class hours: M W 1:25. Staff.

211–212 Intermediate Cantonese I 211, fall; 212, spring. 4 credits each term. Prerequisite Cantonese 112 or permission of instructor.

Hours to be arranged. S. Fessler.

213–214 Introduction to Classical Chinese 213, fall; 214, spring. 3 credits each term. Prerequisite: qualification in Chinese or permission of instructor. This course may be taken concurrently with Chinese 101–102, 201–202, or 301–302.

213: M W 11:15, plus 1 hour to be arranged. 214: hours to be arranged. Staff.

301–302 Intermediate Chinese II 301, fall; 302, spring. 4 credits each term. Prerequisite for Chinese 301: 202 or equivalent. Prerequisite for Chinese 302: 301.

M W F 11:15. P. Wang.
Readings and drill in modern expository Chinese.

303–304 Chinese Conversation—Intermediate 303, fall; 304, spring. 1 credit each term. S–U grades only. Prerequisite: Chinese 201–202. May be repeated for credit.

T R 1:25. Staff.
Guided conversation and oral composition and translation. Corrective pronunciation drill.

311–312 Intermediate Cantonese II 311, fall; 312, spring. 4 credits each term. Prerequisite: Cantonese 212 or permission of instructor.

Hours to be arranged. S. Fessler.

315–316 Chinese Composition 315, fall; 316, spring. 4 credits each term. Prerequisite: Chinese 202 or 212.

M W F 10:00. P. Ni.
Special emphasis on developing the style and vocabulary of modern written Chinese through practice and example.

401 History of the Chinese Language Fall or spring, according to demand. 4 credits. Prerequisite: permission of instructor.

Hours to be arranged. J. McCoy, C. Ross.
Survey of phonological and syntactic developments in Chinese.

403 Linguistics Structure of Chinese: Phonology and Morphology Fall or spring according to demand. 4 credits. Prerequisite: permission of instructor.

Hours to be arranged. C. Ross.
Introductory course in the structure of modern Mandarin Chinese.

[404 Linguistic Structure of Chinese: Syntax Fall or spring, according to demand. 4 credits. Prerequisite: permission of instructor. Not offered 1981–82.

C. Ross.
Syntax of modern Mandarin Chinese.]

405 Chinese Dialects Fall, according to demand. 4 credits. Prerequisite: permission of instructor.

Hours to be arranged. J. McCoy.
Introductory survey of modern dialects and their distinguishing characteristics.

411–412 Readings in Modern Chinese Literature 411, fall; 412, spring. 4 credits each term. Prerequisite: Chinese 302.

M W F 1:25. P. Ni.

607 Chinese Dialect Seminar Fall or spring, according to demand. 4 credits. Prerequisite: Chinese 405 and permission of instructor.

Hours to be arranged. J. McCoy.
Analysis or field techniques or both in a selected dialect area.

FALCON Program

J. McCoy, 302 Morrill Hall, 256–6457

161–162 Intensive Mandarin Course 161, fall (parallels first 16 credits of instruction in regular program); 162, spring (parallels second 16 credits of instruction in regular program). Prerequisite: permission of instructor.

J. McCoy and staff.

Dutch

131–132 Reading Course 131, fall; 132, spring. 3 credits each term. Prerequisite: permission of instructor.

Hours to be arranged. F. C. Van Coetsem.

Seminar in Dutch Linguistics (German 740)

English

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 2:30–3:35. M. Martin.
Designed for those who have completed English 102 and who require or desire further practice. Emphasis is on developing control of written as well as spoken language.

211–212 English as a Second Language 211, fall; 212, spring. 3 credits each term. Prerequisite: placement by the instructor.

M W F 10:10, 11:15, 2:30, 3:35; T R 2:30–4. M. Martin.
Advanced reading and writing with emphasis on improving vocabulary and control of college-level written English.

213 English for Non-Native 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.

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 homes is not English. Intensive work in written English is offered, with emphasis on sentence structure, cohesion, vocabulary expansion, maturity of style, and grammatical structure and pronunciation.

French

J. Béreaud, chairman; N. Furman, director of undergraduate studies (literature); 278A Goldwin Smith Hall, 256–4766. D. Brewer, A. M. Colby-Hall, I. Daly, D. I. Grossvogel, J. Herschensohn, R. Klein, P. Lewis, S. A. Littauer, E. P. Morris, J. S. Noblitt, A. Seznec, L. R. Waugh

The Major

The major in French is designed to give students proficiency in the oral and written language, to acquaint them with French literature and culture, and to develop skills in literary and linguistic analysis.

While prospective majors should try to plan their programs as far ahead as possible, no student will be refused admission merely because of a late start. It is even possible for a student to begin French at Cornell and become a major. Students wishing to major in French should consult the director of undergraduate studies, Professor Furman, 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 which 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 (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 French 202. At least one of these should be completed successfully no later than the end of the sophomore year.

The Options

The following groups intentionally overlap in part, yet each is intended to emphasize different aspects of French culture.

The literature option

- 1) The successful completion of six additional courses in French literature or civilization at the 300 level or above. These courses will be selected in consultation with the student's major adviser and will normally include at least one course from each of the three major periods of French literature (medieval to Renaissance, the seventeenth and eighteenth centuries, and the nineteenth and twentieth centuries).

- 2) The successful completion of two related courses in one of the following: (a) French literature; (b) French linguistics; (c) French history, culture, music, or history of art or architecture; (d) courses in linguistic theory, history of language, psycholinguistics, or philosophy of language.

The linguistic option

- 1) The successful completion of six courses in French and general linguistics (in addition to Linguistics 101–102). These courses will include at least one course in the history of French and one course in the structure of French.
- 2) The successful completion of two courses (preferably a sequence) in one of the following: (a) French literature and civilization; (b) psycholinguistics; (c) philosophy of language, (d) anthropological linguistics.

Whatever option a student chooses, he or she is urged to take advantage of the ample flexibility offered by the French major. Students who wish to pursue careers in business, law, medicine, or teaching may coordinate their work with preprofessional programs. Similarly, interdisciplinary work is strongly encouraged; students may elect to enrich their major with related courses in history, archaeology, Classics, comparative literature, English and American literature, anthropology, music, history of art, philosophy, government, linguistics, and other literatures and languages.

Study abroad. 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 Departments of Romance Studies and Modern Languages and Linguistics and allow for the transfer of credit. The director of undergraduate studies has information about such plans.

Honors. The honors program encourages well-qualified students to do independent work in French, outside the structure of courses. The preparation of the senior honors essay, generally involving three terms, provides a unique learning opportunity since it allows for wide reading, careful outlining, and extensive rewriting to a degree not practically possible in the case of course papers. At each stage of their work, the students will have regular weekly meetings with faculty tutors.

No special seminars or courses are required of honors students. The junior tutorial (ordinarily two terms) will be devoted to intensive study of selected problems or authors and to the choice of a topic for the honors essay; the senior tutorial is devoted to the writing of that essay. Honors students may be released from one or two courses in either the junior or senior year to have adequate time for honors work. (Credit is obtained by enrolling in French 419–420.) Students will take an informal oral examination at the end of the senior year. Honors students are selected on the basis of their work in French language and literature courses in the freshman and sophomore years. Students interested should consult Professor Morris for details no later than the spring term of the sophomore year, and earlier if possible. Honors work in French linguistics will be supervised by Professor Waugh.

Fees. Depending on the course, a small fee may be charged for copies of texts for course work.

Languages 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: 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, 2:30, or 3:35. J. Noblitt, 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.

J. Herschensohn.

An all-skills course designed as the final course in the sequence. A review of grammar is included in addition to reading, writing, and conversation.

200 Intermediate Course: Language and Literature Fall or spring. 3 credits. Prerequisite: qualification in French with a CEEB score no higher than 629. Offered by the Department of Romance Studies.

Fall: M W F 9:05 or 12:20 or T R 8:40. Spring: M W F 9:05, 12:20 or T R 10:10–11:25. Staff.

Designed to provide an introductory examination of contemporary French culture and literature. Texts read and discussed are selected for their cultural and humanistic value. Grammar is reviewed, and emphasis is on linguistic and analytic 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, or placement by Advanced Standing Examination offered by the Department of Modern Languages and Linguistics or the Department of Romance Studies. Taught in French.

Fall: Lec, T 2:30 or W 1:25; drills, M W F 10:10, 2:30, or 3:35. Spring: Lec, T 10:10 or W 1:25; drills, M W F 9:05, 10:10, 11:15, 12:20, or 1:25.

S. A. Littauer.

Emphasis on conversation with some grammar review and compositions, all based on contemporary texts.

211 Intermediate French Fall. 3 credits. Offered by the Department of Romance Studies. Prerequisite: qualification in French. Taught in French.

M W F 10:10 or T R 10:10–11:25. N. Furman and staff.

211 provides a systematic grammar review with emphasis on written exercises; reading competence is acquired through the study of short stories.

212 Intermediate French Spring. 3 credits. Offered by the Department of Romance Studies. Prerequisite: French 211 or 203, or placement by Cornell Advanced Standing Examinations administered by either the Department of Modern Languages and Linguistics or the Department of Romance Studies. Taught in French.

M W F 11:15 or 12:20. N. Furman and staff.

French 212 is concerned with vocabulary expansion and the development of analytical reading ability.

310 Advanced Conversation Fall or spring. 2 credits. Enrollment limited. Prerequisite: French 203 or 211 (or equivalence on the Cornell CASE placement examination).

T R 8:40–9:55. J. Béreaud and staff.

This course is based on audiovisual materials used in the classroom: 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. Offered by the Department of Romance Studies. Prerequisite: French 204 or 212 or placement by the CASE test.

M W F 10:10 or 1:25. J. Béreaud and staff.
All-skills course. Detailed study of present-day syntax. Reading and discussion of texts of cultural relevance.

312 Advanced Composition and Conversation

Spring. 4 credits. Prerequisite: French 311 or placement by CASE test.

M W F 10:10 or 1:25. Staff.
Continuation of work done in French 311. Grammar will be curtailed, reading and discussion of literary texts of wide interest will be increased.

[424 Composition and Style Spring. Not offered 1981–82; next offered 1982–83.]

401 History of the French Language Fall.

4 credits. Prerequisites: qualification in French and Linguistics 101, or permission of instructor. Offered alternate years.

M W F 2:30. J. Herschensohn.
Diachronic development of French from Latin with emphasis on phonological and morphological change. Course work includes problems in reconstruction, textual analyses, discussions of theoretical topics, and external history.

407 Applied Linguistics: French Fall. 4 credits.

Prerequisite: qualification in French.

M W F 10:10. J. S. Noblitt.
Designed to equip the student with the ability to apply linguistic descriptions in teaching French, with special emphasis on phonetics and morphology.

408 Linguistics Structure of French Spring.

4 credits. Prerequisite: qualification in French and Linguistics 101, or permission of instructor. Offered alternate years.

M W F 2:30. J. Herschensohn.
A descriptive analysis of modern French with emphasis on its phonology, morphology, and syntax.

[410 Semantic Structure of French Fall or spring.

4 credits. Prerequisite: permission of instructor.

Offered in alternate years. Next offered 1982–83.

Hours to be arranged. L. R. Waugh.
Introduction to French semantic elements—morphological, lexical, and syntactic—from a Jakobsonian perspective.]

602 Linguistic Structure of Old and Middle French Spring. 4 credits.

Prerequisite: French 408 or permission of instructor.

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: French 408 or permission of instructor.

Hours to be arranged. L. R. Waugh.
Discussion of various views of French phonology and morphology.

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

105 Freshman Seminar: The French Novel Fall.

3 credits.

M W F 1:25. A. Colby-Hall.
Evolution of the French novel from the seventeenth century to the present. Discussion of novels by such

writers as Madame de Lafayette, Laclos, Stendhal, Flaubert, Malraux, Sartre, and Robbe-Grillet (readings in English translation).

107 Freshman Seminar: Readings in Modern Literature Fall or spring. 3 credits.

Fall: M W F 9:05. Spring: M W F 9:05. Staff.

What sense of modernity is conveyed by literary works of our time that ask what it means to live in a century of world wars and triumphant technology? Representative texts of twentieth-century French literature are discussed in the context of current intellectual and social issues. Works by such writers as Gide, Malraux, Sartre, Ionesco, Genet, and Bataille (readings in English translation).

201 Introduction to French Literature Fall or spring. 3 credits.

Prerequisite: qualification in French. French 201 serves as a prerequisite for all 300-level courses in French literature and is required of all majors. Students are strongly urged to take 201 before 202. The course is divided into small sections of three types: those conducted in French; those that use more French as the term progresses; those conducted in English. The reading in each section is in French and is the same; students may write their principal papers in English. Relative freedom to change from one section of the course to another is given during the first two weeks.

Fall: M W F 9:05, 10:10, 11:15, or 12:20 or T R 8:40–9:55, 10:10–11:25. (Tentatively, the sections primarily conducted in English will be M W F 9:05 and 12:20; the sections primarily conducted in French will be M W F 11:15 and T R 10:10–11:25. The section using both French and English will be M W F 10:10 and T R 8:40–9:55.) Spring: M W F 11:15 or 1:25, T R 10:10–11:25. R. Klein and staff.
The work of five or six major French authors from the nineteenth and twentieth centuries is introduced. Stress is on literary analysis and the development of reading skills. The larger historical framework in which French literature is considered as a whole, and more general questions of cultural anthropology, linguistics, sociology, and aesthetics are raised. Readings are chosen from the works of such authors as Baudelaire, Flaubert, Mallarmé, Rimbaud, Proust, Sartre, Malraux, Beckett, and Ionesco.

202 Studies in French Literature Fall or spring.

3 credits. Prerequisite: French 201 or a CEEB 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). Students are urged to take French 201 before 202. Required of all majors, but not limited to them. A fee is charged for a number of short texts distributed by the instructor.

Fall: T R 10:10–11:25; staff. Spring: M W F 10:10, 11:15, or T R 10:10–11:25; P. Lewis and staff.
Study of the classic literature of seventeenth-century France (Corneille, Racine, Molière, Madame de Lafayette) and its immediate forebears (Montaigne) and successors in the Enlightenment (Voltaire, Rousseau, Diderot, Beaumarchais).

320 French Civilization Spring. 4 credits.

Prerequisite: proficiency in French. Typically taken after French 203 or 211 or equivalent. Conducted in French.

M W F 10:10. J. Béreaud.
Study of contemporary French institutions, culture, and attitudes.

[331 Masterpieces of French Drama I: The Classical Era Fall. P. Lewis. Not offered 1981–82.]

[332 Masterpieces of French Drama II: The Modern Era Spring. D. Grossvogel. Not offered 1981–82.]

[334 The Novel as Masterwork: French Novels of the Nineteenth Century Not offered 1981–82; next offered 1983–84.]

[335 The Novel in France: From the Origins to the French Revolution Fall. Not offered 1981–82; next offered 1982–83.]

336 Twentieth-Century Fiction Spring. 4 credits.

T R 1:20–2:15. R. Klein.
This course is intended to survey major works of prose fiction spanning sixty years in the twentieth century. It presupposes the work of French 201 and requires a substantial reading vocabulary. It will pay particular attention to the psychological states of characters and narrators as they are depicted or enacted by these novels. The course will consider the reflection of these psychological states on the formal structure of the work and their implication in a specific historical situation. Readings will include works of Gide, Proust, Mauriac, Sartre de Beauvoir, Blanchot, Duras, Robbe-Grillet, Malraux.

337 French Poetry from Its Origins to the Revolution of 1789 Fall. 4 credits. Conducted in French.

T R 10:10–11:25. 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, decapitation. Focus on six major figures: Rutebeuf, Machaut, Villon, Ronsard, La Fontaine, Chénier. Close reading of poetic texts.

338 French Poetry in the Twentieth Century Spring. 4 credits.

Conducted in French.

M W F 10:10. D. I. Grossvogel.
This course proposes to examine the poetry of Claudel and Valéry, their literary roots as well as their breaks with tradition, in order to read with some sense of discrimination the more recent contributions to poetry of such figures as Apollinaire, Breton, Eluard, Aragon, Michaux, Prévert, Char, Perse, et cetera. This will be an undergraduate lecture course conducted in French with ample opportunity for class discussions.

[347 Masterpieces of Medieval Literature Not offered 1981–82.]

[368 The Baroque in France A. Seznec. Not offered 1981–82.]

[369 French Classicism P. Lewis. Not offered 1981–82.]

379 Victor Hugo and the Romantic Movement Fall. 4 credits.

Taught in French.

T R 1–2:15. N. Furman.
A study of French Romanticism through the works of Victor Hugo, the movement's leading playwright, novelist, and poet.

[385 Experimental and Contemporary French Novels: Subversion of the Novelistic Genre from Diderot to the Present Fall. D. Grossvogel. Not offered 1981–82.]

[387 From Parnassus to Surrealism Fall. Not offered 1981–82.]

419–420 Special Topics in French Literature

419, fall; 420, spring. 2–4 credits each term.

Prerequisite: permission of instructor.

Staff.
Guided independent study of special topics.

429–430 Honors Work in French 4 credits each term, with permission of the adviser. Open to juniors and seniors. Consult the director of the honors program.

E. Morris.

447-448 Medieval Literature 447, fall; 448, spring. 4 credits each term. Prerequisite: French 201 or consent of the instructor. First term not prerequisite to the second.

M W F 9:05. A. Colby-Hall.
French 447 deals with the epic and the theater; 448 with the romance and the lyric. Facility in reading Old French and appreciation of these four major genres are the primary goals of this course.

[452 Theatre in Sixteenth-Century France] Spring. Not offered 1981-82.]

[456 Literature and the Arts in Sixteenth-Century France] Spring. Not offered 1981-82.]

457 Rabelais Fall. 4 credits. Conducted in French. W 2:30-4:25. E. Morris.

Attentive, well-informed, speculative reading of Rabelais's French works is an enjoyable and strenuous entertainment. Some questions it raises may be extended and clarified by the study of popular culture at the end of the Middle Ages (farces and sideshows, street life and village life, chapbooks and almanacs, the sermons of the Franciscan preachers); others, by the history of Renaissance medicine and the learned recovery of the classical tradition; others still, by consulting recent anthropology and depth psychology on such matters as jokes and play, obscenity, nightmares, and myths. Modern theories of language may help to understand Rabelais's purposes, and those of James Joyce, his nearest kin.

[458 Montaigne] Spring. Not offered 1981-82; next offered 1982-83.]

[461 The Theatre of Molière] Fall. Not offered 1981-82.]

[473 Diderot and the Enlightenment] Fall. Not offered 1981-82.]

[483 Feminism and French Literature (also Women's Studies 483)] Not offered 1981-82.]

[490 French Film and Literature in the Twentieth Century] Spring. D. Grossvogel. Not offered 1981-82.]

[496 The Aesthetics of Coincidence (also Comparative Literature 496)] Not offered 1981-82.]

[637 Old French Dialectology] Fall. A. Colby-Hall. Not offered 1981-82.]

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 1981-82.]

[646 Medieval Seminar: Villon] Spring. A. Colby-Hall. Not offered 1981-82.]

[648 Medieval Seminar: La Roman de la Rose] Spring. A. Colby-Hall. Not offered 1981-82.]

[658 Poetry and the Powers] Not offered 1981-82; next offered 1983-84.]

[661 Racine and His Critics] Fall. Not offered 1981-82.]

666 Seventeenth-Century Seminar: Moralities in Fiction—The Classical Moment (also Comparative Literature 666) Spring. 4 credits. Conducted in French.

T 2:30-4:25. P. Lewis.
The reflections of Montaigne and Rousseau on the education of children can serve as convenient frames of a "moralist" tradition within which the ethical issues raised by the writing of fiction undergo intensive

critical scrutiny. After attempting to formulate these issues in both historical and philosophical terms, this course will focus principally on short fictional works of the classical period, notably Pascal's *Provinciales*, selected fables of La Fontaine, selected tales of Perrault, *Les Lettres portugaises*, and perhaps a work (or fragment of one) by Madame de Lafayette. Each case will be approached with the same analytic procedure: the semiotics of narrative will be appropriated as an instrument for deconstructing fictional solutions to moral dilemmas. An attempt will be made to compare and integrate the results of these analyses so as to suggest what is at stake in ethically oriented interpretation.

[669 Seventeenth-Century Seminar: Illusion and Representation] P. Lewis. Not offered 1981-82.]

683 Lacan (also Comparative Literature 607) Fall. 4 credits.

M 2:30-4:25. R. Klein.
The work of Jacques Lacan has dominated French intellectual life for most of the last decade. The study of his contribution to the spread of psychoanalytic theory, his effect on the therapeutic practice of psychiatry, and his role in expanding the horizons of many associated disciplines will be subordinated in this course to the question of his direct influence on literary critical theory and on the theory of interpretation. Some attempt will be made to measure the stakes of the various polemics at whose center he has regularly been found. The difficulty of his style requires that the student have some familiarity with French, although only texts already translated into English will be assigned.

689 Bohemians and Dandies Spring. 4 credits. Taught in French.

W 2:30-4:35. N. Furman.
The counter culture of the nineteenth century will be studied in the works of such writers as Bertrand, Gautier, Nerval, Villiers de L'Isle-Adam, Huysmans, Valles, and Jarry.

694 Six Critics in Search of an Author: Sartre, Criticism, Critics (also Comparative Literature 604) Spring. 4 credits.

M 2-4. D. I. Grossvogel.
This seminar proposes to review Sartre's main contributions to literature (fiction, theatre, criticism) and to examine some of the criticism which his magnum opus has engendered and influenced. The critics would be Blanchot, Girard, Jameson, Marcuse, Mehlman, Ricardou.

Related Courses in Other Departments

Nineteenth-Century French Realism and Modern Discourse Theory (Society for the Humanities 420)

Germanic Studies

H. Deinert, director of undergraduate studies (literature), 188 Goldwin Smith Hall, 256-3932;
H. L. Kufner, director of undergraduate studies (language). E. Augsberger, V. T. Bjarnar, E. A. Blackall, I. Ezerzgalis, S. L. Gilman, A. Groos, W. Harbert, P. Hohendahl, J. H. Jasanoff, I. Kovary, P. W. Nutting, J. P. Stern (professor-at-large), G. Valk, F. C. van Coetsem

The German Major

Students majoring in German are encouraged to design their programs in a manner that will allow for diversity in their courses of study. It should enable them to become acquainted with an adequate selection of major works, authors, and movements of German literature and to develop their skill in literary analysis. Students majoring in German will normally proceed through German 201, 202, 203, 204. Students who, because of previous training, are qualified to enroll in 300- or 400-level courses will be permitted to do so. For details, students may consult the major advisers, H. Deinert in the Department of

German Literature or H. L. Kufner in the Department of Modern Languages and Linguistics. Students majoring in German are expected to complete successfully a minimum of six 300- and 400-level courses in addition to German 303-304. These courses should be a representative selection of subjects in German literature or Germanic linguistics or both. The attention of students majoring in German is called to the courses offered by the Department of Comparative Literature, 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 please consult the major advisers, H. Deinert or H. L. Kufner. All German majors, particularly those who have had no German prior to coming to Cornell, are encouraged to spend at least part of their junior year abroad.

German Area Studies Major

The German area studies major is intended for students who are interested in subject matter related to German-speaking countries, but not necessarily or not exclusively in German literature or linguistics. Students will select appropriate courses offered in history, government, economics, music, theatre arts, or other suitable subjects. These students will select a committee of two or more faculty members to help them design a program and supervise their progress. One committee member must be from the German faculty of either the Department of Modern Languages and Linguistics or the Department of German Literature. The other member(s) should represent the student's main area of interest.

The student majoring in German area studies is expected to become competent in the German language. Such competence is normally demonstrated by successful completion of German 304. A minimum of six area courses above the 200 level is required for the major.

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 451 and 452 may form part of the program.

Freshman Seminar Requirement

The following courses will satisfy the Freshman Seminar requirement: German 109, 151, 211, and 312. For details, please consult the instructors.

Languages and Linguistics

121-122 Elementary Course 121, fall; 122, spring. 4 credits each term. Prerequisite for German 122: 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 2:30; 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; drills, 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. E. Augsberger and G. Valk.

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. E. Augsberger and G. Valk.

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: 303 or equivalent.

M W F 1:25. E. Augsberger and G. Valk.

Emphasis is on increasing the student's oral and written command of German. Detailed study of present-day syntax and different levels of style.

[401 Introduction to Germanic Linguistics

Fall. 4 credits. Prerequisite: Linguistics 101 or permission of instructor. Not offered 1981–82.

Hours to be arranged. F. van Coetsem.

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. J. Jasanoff and

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 601. Not offered in 1981–82.

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 601. Not offered 1981–82.

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.

Hours to be arranged. H. L. Kufner.

Survey of German dialects, the work done at the Sorchatlas, and a discussion of modern approaches to dialectology.

[406 Runology

Fall. 4 credits. Prerequisite: German 401. Not offered 1981–82; next offered 1982–83.

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.

Hours to be arranged. 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 1981–82.

Hours to be arranged. F. van Coetsem.

Linguistic structure of Gothic with extensive readings of Gothic texts.]

603–604 Old Saxon, Old High German, Old Low

Franconian, Old Frisian 604, 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

Fall. 4 credits.

Prerequisite: German 401. Not offered 1981–82.

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.

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.

Hours to be arranged. W. E. Harbert.

A diachronic and comparative investigation of syntactic processes in the older Germanic languages.

609–610 Old Norse

Fall, 609; spring 610. 4 credits

each term.

Hours to be arranged. V. Bjarnar.

Study of the linguistic structure of Old Norse with

extensive reading of Old Norse texts.

[611 Readings in Old High German and Old

Saxon Fall. 4 credits. Not offered 1981–82.

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 1981–82.

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: 631 or

equivalent.

M W F 4:30 or T R 10:45–12:00. J. Kovary.

Emphasis is on developing skill in reading, although some attention will be devoted to the spoken

language, especially to listening comprehension.

[710 Seminar in Germanic Linguistics

Fall or

spring, subject to the needs of students and to the

limitations of staff time. 4 credits. Not offered

1981–82. W. E. Harbert.]

720 Seminar in Comparative Germanic

Linguistics Fall or spring, subject to the needs of

students and to the limitations of staff time. 4 credits.

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

109 Folk Tales and Folk Poetry

Fall and spring.

3 credits each term.

M W F 8 or T R 9:05–9:55. B. C. Buettner 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 which can be redirected to the student's own expository writing. 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 9:05–9:55. H. Deinert and staff.

The 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*, *Siddharta*, *The Metamorphosis*, *Death in Venice*, *Mother Courage*, *Galileo*, and others) the emphasis of the course will be on improving writing skills. We will meet twice a week for lectures and discussion. In lieu of a third class meeting there will be regular conferences between students and their instructors to discuss the papers.

Courses Offered in German

201 Introduction to German Literature I

Fall and

spring. 3 or 4 credits each term. Prerequisite:

qualification in German or permission of instructor.

Taught in German. Fulfills both the language proficiency requirement and, followed by German

202, the humanities distribution requirement.

Fall: M W F 12:20 or T R 12:30–1:35. Spring: M W

F 12:20. I. Ezergailis and staff.

An intermediate course designed to improve reading,

writing, speaking, and listening skills in German.

Emphasis is placed on developing reading

competency, tools of literary analysis, and expansion

of vocabulary. Grammar review included. Readings

from major twentieth-century authors, including

Brecht, Duerrenmatt, Frisch, Aichinger, Bachmann,

Musil, and Kafka.

202 Introduction to German Literature II

Fall and

spring. 3 or 4 credits each term. Prerequisite:

German 201 or permission of instructor. Taught in

German.

Fall: T R 12:20–1:35. Spring: M W F 12:20 or T R

12:30–1:35. I. Ezergailis 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 (CEEB achievement score of 680 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 304 or equivalent. Taught in German.

T R 12:20–1:35. B. Decker.
Introduction to the history of postwar Germany, the development of the two Germanies, 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. Taught in German. May be used to satisfy the Freshman Seminar requirement.

T R 2:30–4. I. Ezergailis.
Designed primarily as a sequel to German 211. Emphasis is on German literature since 1900 (Thomas Mann, Hesse, Kafka, Brecht, Duerrenmatt, Peter Weiss, Plenzdorf, Rilke, Benn, Celan). Supplementary reading from contemporary philosophy, psychology, sociology, and political theory.

[355 The Age of Goethe] Not offered 1981–82.]

356 Major Works of Goethe Fall. 4 credits. Prerequisite: German 201–202 or permission of instructor. Taught in German.

W 2:30–4:30. H. Deinert.
Faust, Part I and the final act of Part II; *Torquato Tasso*; *Iphigenie*; *Werther*; *Wahlverwandtschaften*; *Novelle*; selections from *Wilhelm Meister*; selections from critical and scientific writings; plus a representative selection of lyrical poetry.

[357 Romanticism] Not offered 1981–82.]

359 Fin de Siècle Vienna Spring. 4 credits. Prerequisite: 201–202 or 203 or permission of instructor. Taught in German.

M W F 9:05. D. McGraw.
At the close of the last century artists, intellectuals, and literati in Austria were aware that they stood at the end of one age and at the beginning of another. The Viennese *fin de siècle* is the resulting decade-long revolt against tradition and search to define the modern. This course will focus on short works of Kraus, Hofmannsthal, Freud, Schnitzler; lectures in German on the intellectual background of the period. Discussion may be in English if necessary.

[361 Modern German Literature I: Contemporary German Prose] Not offered 1981–82.]

[362 Modern German Literature II: Twentieth-Century Prose] Not offered 1981–82.]

[363 Modern German Literature III: Contemporary Literature] Not offered 1981–82.]

[365 Lyrical Poetry] Not offered 1981–82.]

Courses in English Translation

[314 Nietzsche, The Man and the Artist] Not offered 1981–82.]

[315 Topics in German Literature I: The Modern German Novel in English Translation] Not offered 1981–82.]

[324 Old Icelandic Literature] Not offered 1981–82.]

[350 Yiddish Literature in English Translation] Not offered 1981–82.]

[377 Topics in Yiddish Literature] Not offered 1981–82.]

Advanced Courses

405–406 Introduction to Medieval German Literature 405, fall; 406, spring. 4 credits each term. Prerequisite for 405: reading knowledge of German. Prerequisite for 406: 405 or the equivalent.

M W F 10:10. Fall, B. C. 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.

417 The Great Moments of German Literature I Fall. 4 credits. Prerequisite: reading knowledge of German. This course is designed primarily for undergraduates, but is also open to graduate students who will be expected to do extra reading and to write two papers. Undergraduates will follow the syllabus as announced, with one preliminary examination and a final examination. Graduates will write the papers in lieu of the examinations.

M W F 11:15. E. A. Blackall.
The course will begin with the earliest important monument, the eighth-century *Hildebrandslied*. We will then study the most important medieval epics and sample some of the finest lyrical poetry of the German Middle Ages. After that we will discuss Luther's great hymns, the folk songs of the sixteenth century, and, as an example of a folk book, the first narrative of the career of Doctor Faust. From the seventeenth century we will study a selection of poems and the greatest novel of the period, *Simplicissimus*. In the eighteenth century we will acquaint ourselves with the major poets (including Goethe) and some dramas by Lessing, Goethe, and Schiller. The medieval texts will be read in English translation but students will also be shown short samples of the originals. All other texts will be read in German.

418 The Great Moments of German Literature II Spring. 4 credits. Prerequisite: reading knowledge of German; 417 is not a prerequisite for 418. This course is designed primarily for undergraduates, but is also open to graduate students who will be expected to do extra reading and to write two papers. Undergraduates will follow the syllabus as announced, with one preliminary examination and a final examination. Graduates will write two papers in lieu of the examinations.

M W F 11:15. E. A. Blackall.
The course will begin with romanticism in Germany and proceed through what would normally be considered the most important works in German literature up to the time of Thomas Mann, Kafka and Rilke. We will consider examples from the major poets, dramas by Grillparzer, Buchner, Hebbel, Schnitzler, and Brecht, and the major monuments in shorter prose fiction. Some consideration will also be given to the work of Nietzsche as a literary figure. The primary aim will be to assure that those who seek a knowledge of German literature do know what is most important.

[427 Baroque Literature] Not offered 1981–82.]

[438 Twentieth-Century German Literature] Not offered 1981–82.]

451–452 Independent Study 451, fall; 452, spring. 1–4 credits each term. Prerequisite: permission of instructor.

Hours to be arranged. Staff.

Seminars

For complete descriptions of courses numbered 600 or above consult the appropriate instructor.

[611–612 Seminar in Old Icelandic Literature I and II] Not offered 1981–82.]

623 Seminar in Medieval German Literature I Fall. 4 credits.

T 1:25. A. Groos.
Topic: *Minnesang*.

[624 Seminar in Medieval German Literature II] Not offered 1981–82.]

[625 The Northern Renaissance and Reformation] Not offered 1981–82.]

[629 The Enlightenment] Not offered 1981–82.]

[631 From Wilhelm Meister to Buddenbrooks] Not offered 1981–82.]

632 Schiller Fall. 4 credits.

M 1:25. A. Groos.

633 Problems in Romanticism: Hoelderlin (also Comparative Literature 633) Spring. 4 credits.

M 1:25–3:25. T. Bahti.
A seminar in close interpretation of the work of Germany's major romantic poet. Emphasis will be on the late "hymns," but attention will also be given to the earlier lyrics, *Hyperion*, the theoretical writings, the *Empedokles* project, and the late translations of Sophocles and Pindar. The works will be read in the contexts of German idealist philosophy and European romanticism. Qualified undergraduates admitted with the permission of the instructor; reading knowledge of German required.

635 Backgrounds of German Realism Fall. 4 credits.

M 3:35. P. Hohendahl.

[636 Nineteenth-Century Drama] Not offered 1981–82.]

[637 Seminar in Realism] Not offered 1981–82.]

[638 Twentieth-Century German Literature] Not offered 1981–82.]

[639 Modern Lyric Poetry] Not offered 1981–82.]

641 The Postwar German Novel: Broch and Musil Spring. 4 credits.

Hours to be arranged. I. Ezergailis.

650 Graduate Seminar in Medieval Literature (also English 710) Spring. 4 credits.

Hours to be arranged. A. Groos.

[682 Seminar on Richard Wagner (also Music 678)] Not offered 1981–82.]

753–754 Tutorial in German Literature 753, fall; 754, spring. 1–4 credits each term. Prerequisite: permission of instructor.

Hours to be arranged. Staff.

Related Courses in Other Departments

Survey of German History 1648–1890 (History 357)

Survey of German History 1890–Present (History 358)

The European Novel (Comparative Literature 363–364)

Marxist Cultural Theory (Comparative Literature 381)

New German Cinema and The Question of The Text (Comparative Literature 396)

The Divided Self in Women's Writing (Comparative Literature 399)

History of Literary Theory (Comparative Literature 403)

Metaphor, Modernism, and Cultural Context: The Use of Metaphor in Modernist Hebrew, Yiddish, English, and American Poetry (Comparative Literature and Near Eastern Studies 405)

The Novelle in World Literature (Comparative Literature 414)

The Reception of the Idea of the Woman in the Late Nineteenth Century (Society for the Humanities 421–422)

Nietzsche: Aspects of His Reception (Society for the Humanities 425–426)

Seminar in European Fascism (History 457)

Seminar in Literary Theory: *Rezeptionsaesthetik* (Comparative Literature 494)

Literature and History (Comparative Literature 698)

Modern Greek

See Department of Classics.

Modern Hebrew

See Department of Near Eastern Studies.

Hindi-Urdu

101–102 Hindi-Urdu Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Hindi 102: 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. Prerequisite for Hindi 201: qualification in Hindi. Prerequisite for Hindi 202: 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. Prerequisite for Hindi 203: qualification in Hindi. Prerequisite for Hindi 204: 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. Prerequisite for Hindi 301: Hindi 202. Prerequisite for Hindi 302: 301 or equivalent.

Hours to be arranged. G. Kelley.

303–304 Advanced Composition and Conversation 303, fall; 304, spring. 4 credits each term. Prerequisite for 303: Hindi 204 or equivalent. Prerequisite for Hindi 304: 303 or equivalent.

Hours to be arranged. G. Kelley.

305–306 Advanced Hindi Readings 305, fall; 306, spring. 4 credits each term. Prerequisite for Hindi 305: 202 or equivalent. Prerequisite for 306: 305 or equivalent.

Hours to be arranged. G. Kelley.

Intended for those who wish to do readings in history, government, economics, et cetera, instead of literature.

[401 History of Hindi] Fall or spring. 4 credits.

Prerequisite: Hindi 101–102 or equivalent, or Linguistics 102. G. Kelley. Not offered 1981–82.]

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. Not offered 1981–82.]

Indonesian

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Indonesian 102: 101.

M–F 8, plus 2 more hours to be arranged.

J. U. Wolff.

A semi-intensive course for beginners.

201–202 Indonesian Reading 201, fall; 202, spring. 3 credits each term. Prerequisite for Indonesian 201: qualification in Indonesian. Prerequisite for Indonesian 202: 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: 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. Prerequisite for 301: Indonesian 201–202 or equivalent. Prerequisite for Indonesian 302: 301.

Hours to be arranged. J. U. Wolff.

303–304 Advanced Indonesian Conversation and Composition 303, fall; 304, spring. 4 credits each term. Prerequisite for Indonesian 303: 204. Prerequisite for Indonesian 304: 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. Prerequisite for Indonesian 401: 302 or equivalent. Prerequisite for Indonesian 402: 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 (literature), 285 Goldwin Smith Hall, 256–7570; C. Rosen, director of undergraduate studies (language), 312 Morrill Hall, 256–4087. G. Mazzotta

The Major

Students who wish to major in Italian should choose a faculty member to serve as a major adviser; the general plan and the details of the student's course of study will be worked out in consultation. Italian majors are encouraged to take courses in related subjects such as history, art history, music, philosophy, anthropology, Classics, linguistics, and other modern languages and literatures. While a major often occupies only the junior and senior years, it is wise for students to seek faculty advice about the major as early as possible.

Students who elect to major in Italian ordinarily should have completed Italian 203–204 and the 201–202 sequence in Italian literature by the end of their sophomore year. Exemptions can be made on the basis of an examination. Students majoring in Italian are expected to become conversant with a fair portion of the masterworks of Italian literature, to acquaint themselves with the outlines of Italian literary history, and to develop some skill in literary analysis. To this end students will be expected to complete successfully 24 credits of Italian literature courses at the 300 level or higher, with papers to be written in Italian or English. One or more courses offered by the Department of Comparative Literature may be counted toward the required 24 credits if students obtain the prior approval of their major adviser. Italian 402, History of the Italian Language, and 403, Structure of Italian, may be counted toward the 24 credits required for the major (an introductory linguistics course is a prerequisite of Italian 402 and 403).

Students majoring in Italian also will 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.

Study abroad. 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.

Languages and Linguistics

121–122 Elementary Course 121, fall; 122, spring. 4 credits each term. Prerequisite for Italian 122: 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; drills M W F 8, 9:05, 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 559. Satisfactory completion of Italian 123 fulfills the qualification portion of the language requirement.

M–F 12:20. C. Rosen and staff.

203–204 Composition and Conversation 203, fall; 204, spring. 3 credits each term. Prerequisite for Italian 203: qualification in Italian. Prerequisite for Italian 204: 203 or equivalent.

M W F 1:25 or 2:30. C. Rosen and staff.

Guided conversation, composition, reading, pronunciation, and grammar review emphasizing the development of accurate and idiomatic expression in the language.

Note: Students placed in 200-level courses also have the option of taking courses in introductory literature; see separate listings under Italian 200, 201, and 202 for descriptions of these courses, any of which may be taken concurrently with the 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 Composition and Conversation Spring. 2 credits. Prerequisite: Italian 204. Not offered 1981–82.]

402 History of the Italian Language Spring. 4 credits. Prerequisite: Linguistics 101 (or equivalent), and qualification in Italian, or permission of the instructor. Offered alternate years.

Hours to be arranged. C. Rosen.
Developments in phonology, syntax, and the lexicon from Latin to modern Italian. Analysis of early texts. Sociolinguistic history of the national language, its regional varieties, and the dialects.

[403 Structure of Italian Fall. 4 credits.
Prerequisite: Linguistics 102 and qualification in any Romance language. Offered alternate years. Next offered 1982–83.]

[432 Italian Dialectology Spring, according to demand. 4 credits. C. Rosen. Not offered 1981–82.]

[700 Seminar in Italian Linguistics Offered according to demand. 4 credits. C. Rosen. Not offered 1981–82.]

Literature

201 Introduction to Modern Italian Literature Fall. 3 credits. Prerequisite: reading knowledge of Italian, or knowledge of another Romance language and permission of instructor. Graduate students may take the course of an S-U basis to fulfill area examination requirements.

M W F 10:10. A. Grossvogel.
A reading of masterpieces of modern Italian literature with attention to the context in which they arose. Highlights of Galileo's and Vico's writings. Selections of prose from the Enlightenment to romanticism. The theater of Goldoni and Pirandello. Poetry from Leopardi to Montale.

202 Introduction to Modern Italian Literature Spring. 3 credits. Conducted in Italian.
M W F 10:10. G. Mazzotta and staff.
Works in Italian literature from the eighteenth century to the present will be read and discussed, with emphasis on the major authors of the twentieth century.

322 Italian Civilization: Literature and Regionalism Spring. 4 credits.
T R 10:10–11:25. A. Grossvogel.
All the regions of Italy will be studied in terms of their historical, literary, artistic, and sociological aspects in conjunction with the projection of the film series *L'Italia Vista dal Cielo* by Folco Quilici. The multiple reasons for still strongly felt regional boundaries, within which diversity and independence are maintained, will be studied mainly through contemporary literary texts.

326 Twentieth-Century Novel Spring. 4 credits.
M W F 2:30–3:20. G. Mazzotta.
The course is conceived as a reading of some "exemplary" texts of the twentieth century by D'Annunzio, Pirandello, Moravia, Calvino and Sciascia (especially *L'affaire Moro*), and will ask of them the questions that are confronting Italy today: revolutionary action, schemes of power, dreams, role and crisis of the intellectual.

[327–328 Dante: La Divina Commedia (also Italian 527–528) Not offered 1981–82.]

334 Dante in Translation (also Comparative Literature 344) 4 credits.
M W F 12:20. G. Mazzotta.
The literary, intellectual, and moral complexities of this fundamental work in our poetic and spiritual history are examined critically. From close readings of some celebrated passages in *Inferno*, *Purgatorio*, and *Paradiso*, the lectures and discussions map out Dante's own interpretations of myths and concerns in classical and Christian culture. We pursue, for instance, Dante's sense of the crisis in the earthly city and how Vergil and St. Augustine are brought to bear on Dante's elaboration. Issues such as utopia, chiliastic impulses, eschatology, are given ample treatment, just as the problem of "how to read" the past and Dante's own formulations is kept steadily under focus.

335 Boccaccio (also Italian 635) Fall. 4 credits.
T R 10:10–11:25. G. Mazzotta.
The course will cover the *Filosofo*, *Teseida*, and mainly the *Decameron* within their appropriate intellectual context, e.g., Vergil, Ovid, the Chartrians, and will discuss pertinent issues, such as play, desire, theories of nature, and wit.

[336 Boccaccio Not offered 1981–82.]

345 Modern and Contemporary Short Fiction in Italy Fall. 4 credits.
M W F 1:25. A. Grossvogel.
The evolution of a hybrid form of narrative between the novel and the novella will be analyzed in the light of contemporary critical theory. From D'Annunzio's *Giovanni Episcopo* to Balestrini's *Vogliamo Tutto*, short works by Verga, Pirandello, Landolfi, Bassani, Calvino, Sciascia and Brancati will be included.

347 Petrarch and the Renaissance Lyric Fall. 4 credits.
T R 12:20–1:35. G. Mazzotta.
The course will focus on the poetry of Petrarch (*Canzoniere*, *Trionfi* and *Africa*), but will consider both the Provencal and early Italian lyrical tradition (*Vita Nuova*, *Rime Petrose*, Cavalcanti) and will probe the extension of the Petrarchan forms into the Italian Renaissance.

[359–360 The Italian Renaissance Not offered 1981–82.]

[366 Seventeenth-Century Prose Not offered 1981–82.]

[370 Eighteenth-Century Thought Not offered 1981–82.]

[381 Verga, Svevo, and Pirandello Not offered 1981–82.]

[387 Nineteenth-Century Poetry: Leopardi Not offered 1981–82.]

[390 Contemporary Narrative in Italy Not offered 1981–82.]

[395 Twentieth-Century Prose: Contemporary Italian Short Fiction Not offered 1981–82.]

399 The Film as Cultural, Artistic, and Political Reflector in Postwar Italy (also Comparative Literature 306) Fall. 4 credits. Open to undergraduates or graduates, especially those interested in the arts, government, history, literature.
T R 2:30–3:45. D. Grossvogel, G. Mazzotta.
An examination of the Italian postwar film as a focal point for the survey and analysis of the political, social, and cultural evolution of postwar Italy. Screenings of twelve films will be scheduled, and a thirteenth film will be scheduled on the last day of class: the final paper will be based on that film.

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.

429–430 Honors in Italian Literature 429, fall; 430, spring. 4 credits each term. Limited to seniors. Prerequisite: permission of instructor.
Staff.

[437 Petrarch: *Canzoniere* Not offered 1981–82.]

[472 Eighteenth-Century Theatre Not offered 1981–82.]

[486 The Nineteenth Century Not offered 1981–82.]

488 Giacomo Leopardi and Modern Italian Poetry in the Nineteenth Century Spring. 4 credits.
T R 1:25–2:40. A. Grossvogel.
A close reading of Leopardi's poems in their interrelation with his prose writings. All the *Canti* and the *Operette Morali* will be read as well as selections from the *Zibaldone*, the *Lettere*, and some of the poetry of his contemporaries (Monti, Foscolo, and Manzoni).

635 Boccaccio (also Italian 635) Fall. 4 credits.
T R 10:10–11:25. G. Mazzotta.
The course will cover the *Filosofo*, *Teseida*, and mainly the *Decameron* within their appropriate intellectual context, e.g., Vergil, Ovid, the Chartrians, and will discuss pertinent issues, such as play, desire, theories of nature, and wit.

639–640 Special Topics in Italian Literature 639, fall; 640, spring. 4 credits each term.
Staff.

Romance Studies Literature Courses

303 Issues: General Concepts in Modern Cultural History (also Comparative Literature 303) Spring. 4 credits.

T R 12:20–1:35. C. M. Arroyo.
The possibility of defining terms such as baroque, classicism, etc. The meaning of those "unwritten texts" in historiography. An attempt at a definition of Humanism, baroque, classicism, romanticism, realism, positivism, Marxism, symbolism, futurism, existentialism, structuralism.

[355 The Picaresque Novel in a European Perspective (also Comparative Literature 355) Not offered 1981–82.]

[459 Being, God, Mind: Humanistic Revolutions from Plato to Vico Not offered 1981–82.]

[460 Biology and Theology: Approaches to the Origin of Life, Evolution, Heritage and Freedom, Sexuality, and Death (also Comparative Literature 460) Not offered 1981–82.]

Japanese

Languages and Linguistics

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Japanese 102: 101 or equivalent. 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.
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.

141-412 Japanese for Business Purposes 141, fall; 142, spring. 4 credits each term. Prerequisite for Japanese 142: 141 or permission of instructor.

M-F 1:25. E. H. Jorden and staff.

Introductory Japanese for specialists in international business and economics.

201-202 Intermediate Japanese I 201, fall; 202, spring. 3 credits each term. Prerequisite for Japanese 201: 102 or equivalent. Prerequisite for Japanese 202: 201 or equivalent.

Lecs, M W F 1:25; drills, W 10:10 (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. Prerequisite for Japanese 203: 102 or equivalent. Prerequisite for Japanese 204: 203 or 205 or equivalent.

Lecs, M W 1:25; drills, M T R F 10:10 (with Japanese 205-206). Staff.

Training in listening and speaking for students who have acquired a basic oral proficiency.

205-206 Intermediate Japanese I and Conversation 205, fall; 206, spring. 6 credits each term. Prerequisite for Japanese 205: 102 or equivalent. Prerequisite for Japanese 206: 205 or equivalent.

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.

301-302 Intermediate Japanese II 301, fall; 302, spring. 4 credits each term. Prerequisite for Japanese 301: 202 or 206 or equivalent. Prerequisite for Japanese 302: 301 or equivalent.

M W F 2:30. Staff.

Reading of selected modern texts with emphasis on expository style.

303-304 Communicative Competence—Intermediate 303, fall; 304, spring. 3 credits each term. Prerequisite for Japanese 303: 204 or 206 or equivalent for Japanese 304: 303 or equivalent. May be repeated for credit.

M W F 1:25. E. H. Jorden and staff.

Drill in the use of spoken Japanese within the constraints set by a sampling of Japanese social settings.

401-402 Advanced Japanese 401, fall; 402, spring. 4 credits each term. Prerequisite for Japanese 401: 302 or equivalent. Prerequisite for Japanese 402: 401 or equivalent.

M W F 2:30. 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. Prerequisite: Japanese 304 or permission of instructor.

T R 1:25. Staff.

Instruction in storytelling, lecturing, and speechmaking, with emphasis on both the construction of discourse and Japanese patterns of oral delivery.

421-422 Directed Readings 421, fall; 422, spring. Credit to be arranged. Prerequisite: permission of instructor.

Hours to be arranged. Staff.

Topics are selected on the basis of student needs.

FALCON

161-162 Intensive Japanese 161, fall; 162, spring. 16 credits each term. Prerequisite: permission of instructor.

M-F, six hours each day. E. H. Jorden and staff.

Japanese

131-132 Elementary Course 131, fall; 132, spring. 3 credits each term. Prerequisite for Japanese 131: qualification in Indonesian.

Prerequisite for Japanese 132: Japanese 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. Prerequisite for Japanese 133: 132 or equivalent. Prerequisite for Japanese 134: 133 or equivalent.

Hours to be arranged. J. U. Wolff.

203-204 Directed Individual Study 203, fall; 204, spring. 3 credits. Prerequisite: Japanese 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 on and conversations under the guidance of a native speaker for three contact hours a week.

Old Japanese (see Linguistics 651-652)

Linguistics

101-102 Theory and Practice of Linguistics

101, fall; 102, spring. 4 credits each term.

M W F 9:05; disc, T or R 3:35. Staff.

An introductory course designed primarily for those who intend to major in a language or in general linguistics. (See Linguistics 111-112 for a course designed for nonmajors.) The course satisfies the social science distribution requirement.

111 Themes in Linguistics Fall. 4 credits. No prerequisites. Intended primarily for nonmajors. (Prospective linguistics majors should see Linguistics 101-102.) This course together with one of Linguistics 112, 244, 302, 405, 406, 415 or 416 provides a general education sequence in linguistics that satisfies the social science distribution requirement. Other linguistics courses may be used to satisfy the requirement if consent is obtained.

M W F 10:10. S. McConnell-Ginet.

Basic linguistic concepts are introduced; relationship of linguistics to other disciplines is explored; emphasis on biological, psychological, social, and cultural contexts of language use.

[112 Themes in Linguistics] Spring. 4 credits.

Prerequisite: Linguistics 111 or permission of instructor. Special topics. Not offered 1981-82.]

113-114 English of Spanish-English Bilinguals 113, fall; 114, spring. 3 credits each term. Linguistics 113 is not a prerequisite for 114.

M W F 1:25. D. F. Solá.

An introductory sociolinguistic 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 English in the different Spanish-English communities established in the United States.

201 Phonetics Fall. 3 credits.

T R 12:20-1:35. J. S. Noblitt.

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 for 202: 201. Not offered 1981-82.

Intermediate level study of practical, experimental, and theoretical aspects of articulatory and acoustic phonetics.]

[244 Language and the Sexes (also Women's Studies 244)] Spring. 4 credits. Prerequisites:

Linguistics 101 or 111, or Psychology 215, or

permission of instructor. M W F 1:25.

S. McConnell-Ginet. Not offered 1981-82.]

302 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.

303 Phonology Fall. 4 credits. Prerequisite:

Linguistics 101 or 111 or 601 or the equivalent.

T R 8:30-9:45. L. R. Waugh.

A general survey of phonemics and of Jakobsonian distinctive feature theory, as well as selected other topics in autonomous phonology.

304 Morphology Spring. 4 credits. Prerequisite:

Linguistics 101 or 111 or 601 or the equivalent.

T R 8:30-9:45. L. R. Waugh.

A general survey focusing on the relationship of meaning and form in morphology.

306 Functional Syntax Fall. 4 credits.

Prerequisite: Linguistics 102 or permission of instructor.

M W F 10:10. D. F. Solá.

A general survey of syntactic theories which highlight grammatical function, and reveal its role in discourse structure.

306 Dialectology Spring. 4 credits. Offered alternate years.

Hours to be arranged. Staff.

Methods and procedures of dialectological study with introduction to the major dialect atlases.

311-312 The Structure of English 311, fall; 312,

spring. 4 credits each term. Prerequisite for

Linguistics 311: 102 or permission of instructor.

Prerequisite for Linguistics 312: 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 601.

T R 12:20-1:50. M. Martin.

A course in modern English for teachers of non-native speakers. An analysis of the phonetics, grammar, and semantics of the language in terms applicable to both classroom teaching and materials development.

314 Teaching English as a Foreign Language

Spring. 4 credits. Prerequisites: Linguistics 313.

T R 12:20-1:50. M. Martin.

Methods and techniques used in teaching of English language skills to non-native speakers are examined. Attention is given to materials design and to current issues and new trends in the fields.

318 Style and Language Spring. 4 credits.

Prerequisite: Linguistics 101 or permission of instructor.

Hours to be arranged. G. M. Messing.

341 India as a Linguistic Area Fall. 4 credits.

Prerequisite: Linguistics 102 or permission of instructor.

Hours to be arranged. J. W. Gair, G. Kelley.

Cross-family influences in an area of interaction over a long time span are considered. No knowledge of Indian languages is expected.

400 Language: A Functional and Semiotic System Spring. 4 credits. Prerequisites: Linguistics 101 and one other course in linguistics, or permission of the instructor.

Hours to be arranged. L. R. Waugh.

An introduction to the study of language as a functionally cohesive system and as a system of signs similar to other semiotic systems.

[401 Language Typology Fall. 4 credits.

Prerequisite: Linguistics 304. Not offered 1981–82.

M W F 1:25. C. F. Hockett.

Examination of a variety of languages in relation to typological categories.]

[402 Contrastive Analysis Spring. 4 credits.

Prerequisite: Linguistics 101–102 or permission of instructor.

Hours to be arranged. H. L. Kufner.

403 Applied Linguistics and Second Language Acquisition Spring. 4 credits. Prerequisite: a course in the structure of a language at the 400 level.

T R 10:10–11:25. J. S. Noblitt.

Examination of the theoretical bases of applied linguistics including current language-teaching methodologies.

404 Comparative Methodology Fall. 4 credits.

Prerequisite: Linguistics 303 or permission of the instructor.

T R 2:30–3:45. R. B. Jones, Jr.

Exemplification of the methods of comparative reconstruction of proto-languages using problems selected from a variety of language families; methods of evaluating reconstructions.

[405–406 Sociolinguistics 405, fall; 406, spring. 4 credits each term. Prerequisites: Linguistics 101–102 or 111–112 or permission of instructor.

Linguistics 405 is not a prerequisite to 406. Not offered 1981–82.

Hours to be arranged. J. U. Wolff.

Social influences (ethnic, socioeconomic, educational) on linguistics behavior; shifts in register, style, dialect, or language in different speech situations.]

410 Historical Linguistics: Methods and Approaches Spring. 4 credits. Linguistics 102 or permission of instructor.

Hours to be arranged. J. Jasanoff.

A survey of the basic mechanisms of linguistic change, with special attention to comparative and internal reconstruction.

411–412 Transformational Grammar: Syntax and Semantics 411, fall; 412, spring. 4 credits each term. Prerequisite for Linguistics 412: 411.

T R 10:10–11:25. J. S. Bowers.

411 introduces the theory of syntax within a generative-transformational framework. 412 is an advanced course on syntax and the relation of syntax to semantics.

413–414 Generative Phonology 413, fall; 414, spring. 4 credits each term. J. S. Bowers. Offered alternate years. Hours to be arranged.

415–416 Social Functions of Language 415, fall; 416, spring. 4 credits each term. Prerequisites: Linguistics 101 or 111, or permission of instructor.

M W F 2:30. 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 Linguistics Semantics Spring. 4 credits.

Prerequisites: Linguistics 101–102 or equivalent, plus a course in syntax or the structure of English or some other language, or permission of instructor.

M W F 11:15. S. McConnell-Ginet.

An introduction to theories of word, sentence, and discourse meaning and their application in linguistic description; readings deal primarily with the semantic analysis of English.

[440 Dravidian Structures Fall or spring according to demand. 4 credits. Prerequisite: Linguistics 102. Not offered 1981–82.

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 Either term. 4 credits.

Prerequisites: Linguistics 101 or 201.

Hours to be arranged. F. E. Huffman.

Elicitation, recording, and analysis of data from a native speaker of a language not generally known to students.

601–602 Proseminar: Introduction to Graduate Study 601, fall; 602, spring. 4 credits each term.

Primarily for entering 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 sub-areas of linguistics. Emphasis is on basic concepts, current issues and their background, and methodology, with discussions and data-oriented problems based on extensive readings.

603 History of Linguistics Fall. 4 credits.

T R 12:20–1:35. 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 1981–82.

Hours to be arranged. J. E. Grimes.

Readings and descriptions of major schools of linguistic thought in the twentieth century.]

[608 Discourse Analysis Spring. 4 credits.

Prerequisite: permission of instructor. Not offered 1981–82.

J. E. Grimes.

Linguistics theory applied to relationships beyond the sentence.]

[610 Topics in Transformational Grammar Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered 1981–82.

Hours to be arranged. J. S. Bowers.

A survey of the development and current state of generative grammatical theory.]

[621–622 Hittite 621, fall; 622, spring. 4 credits each term. Prerequisite for Linguistics 621: permission of instructor. Prerequisite for Linguistics 622: 621 or permission of instructor. J. Jasanoff. Not offered 1981–82.]

[631–632 Comparative Indo-European Linguistics 631, fall; 632, spring. 4 credits each term. Prerequisite for Linguistics 631: permission of instructor. Prerequisite for Linguistics 632: 631 or permission of instructor. Not offered 1981–82.

J. Jasanoff.

Fall: Introduction to phonology, branches of the family. Spring: Grammar.]

640 Elementary Pali Fall or spring, according to demand. 3 credits.

Hours to be arranged. J. W. Gair.

An introduction to the language of the canonical texts of Theravada Buddhism. Reading of authentic texts, with emphasis on both content and grammatical structure.

641–642 Elementary Sanskrit 641, fall; 642, spring. 3 credits each term. Prerequisite for Linguistics 642: 641.

Hours to be arranged. Fall: G. Messing; spring: J. Jasanoff.

672 Comparative Slavic Linguistics Spring. 4 credits. Prerequisite: Linguistics 671 or permission of instructor.

Hours to be arranged. E. W. Browne.

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; linguistic computation; classical and autonomous phonology; Japanese sociolinguistics; relational grammar; semantics and semiotics; and other topics.

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, Jr.

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, Jr.

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: 131 or equivalent. E. W. Browne. Not offered 1981–82.]

133–134 Intermediate Course 133, fall; 134, spring. 3 credits each term. Prerequisite for Polish 133: 132 or equivalent. Prerequisite for Polish 134: 133 or equivalent.

Hours to be arranged. E. W. Browne.

Portuguese

121–122 Elementary Course 121, fall; 122, spring. 4 credits each term. Intended for beginners or for those who have been placed in course by examination. Students may attain qualification upon completion of 122 by achieving a satisfactory score on a special examination.

Lec. W 12:20; drills, M T R F 12:20 or 1:25. 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. Prerequisite for Portuguese 203: qualification in Portuguese. Prerequisite for Portuguese 204: 203 or permission of instructor.

M W F 10:10. 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: 204 or equivalent. Prerequisite for Portuguese 304: 303 or equivalent. Not offered 1981–82.]

305–306 Readings in Luso-Brazilian Culture 305, fall; 306, spring. 4 credits each term. Prerequisites. Portuguese 204 or equivalent or permission of instructor.

Hours to be arranged. Staff.

700 Seminar in Portuguese Linguistics Fall or spring, according to demand. 4 credits.

Hours to be arranged. Staff. Selected problems in the structure of Portuguese.

Quechua

131–132 Elementary Course 131, fall; 132, spring. 3 credits each term. Prerequisite: qualification in Spanish.

M W F 11:15. D. F. Solá.

A beginning conversation course in the Cuzco dialect of Quechua.

133–134 Intermediate Course 133, fall; 134, spring. 3 credits each term. Prerequisite for Quechua 133: 131–132 or equivalent. Prerequisite for Quechua 134: 133 or equivalent.

Hours to be arranged. D. F. Solá.

An intermediate conversation and reading course. Study of the Huarochiri manuscript.

700 Seminar in Quechua Linguistics Fall or spring. Credit to be arranged. Prerequisite: permission of instructor.

Hours to be arranged. D. F. Solá.

Romanian

131–132 Elementary Course 131, fall; 132, spring. Offered according to demand. 3 credits. Prerequisite for Romanian 132: 131 or equivalent. Hours to be arranged. Staff.

133–134 Elementary Course II 133, fall; 134, spring. Offered according to demand. 3 credits. Prerequisite for Romanian 134: 133 or equivalent. Hours to be arranged. Staff.

Romance Studies

Languages and Linguistics

[321–322 History of the Romance Languages] 321, fall; 322, spring. 4 credits each term. Prerequisite for 322: 321. Offered alternate years. Not offered 1981–82.

Diachronic development of the Romance languages from Latin, with emphasis on Spanish, French, Italian, and Romanian. 321 concentrates on external history and phonological changes. 322 concentrates on morphological and syntactic developments.]

323 Comparative Romance Linguistics Spring. 4 credits.

Hours to be arranged. C. Rosen. Basic characteristics of the Romance language family. Salient features of eight Romance languages; broad and localized trends in phonology, syntax, and the lexicon; elements of dialectology.

620 Area Topics in Romance Linguistics Spring. 4 credits. May be repeated for credit. Topics vary. Hours to be arranged. J. S. Noblit.

[621 Problems and Methods in Romance Linguistics] Spring. 4 credits. C. Rosen. Not offered 1981–82; next offered spring 1983.]

[622 Romance Dialectology] Spring. 4 credits. Offered every third year. Not offered 1981–82. Diachronic and synchronic survey of dialects of the Romance language areas.]

Russian

G. Gibian, director of undergraduate studies (literature), 193 Goldwin Smith Hall, 256–4047; R. L. Leed, director of undergraduate studies (language), 207 Morrill Hall, 256–3554. L. H. Babby, E. W. Browne, P. Carden, C. Emerson, N. Perlina, S. Senderovich, A. Zholkovsky

The Russian Major

Russian majors study Russian language, literature, and linguistics, emphasizing their specific interests. It is desirable, although not necessary, for prospective majors to complete Russian 101–102, 201–202, and 203–204 as freshmen and sophomores since these courses are prerequisites to most of the junior and senior courses that count toward the major. Students may be admitted to the major upon satisfactory completion of Russian 102 or the equivalent. Students who elect to major in Russian should consult both Professor Gibian 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, (2) 18 credits from 300- and 400-level literature and linguistics courses, of which 12 credits must be in literature in the original language.

Honors. Students taking honors in Russian undertake individual reading and research and write an honors essay.

Russian and Soviet Studies Major

See the Special Programs and Interdisciplinary Studies section, which follows the department listings.

Languages and Linguistics

101–102 Elementary Courses 101, fall; 102, spring. 6 credits each term. Prerequisite for Russian 102: 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 2:30 or T R 11:15; drills M–F 8, 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: 121 or equivalent. Intended for beginners or students placed by examination. Students who obtain a CPT achievement score of 560 after Russian 121–122 attain qualification and may enter the 200-level sequence; otherwise Russian 123 is required for qualification.

Lec, T 2:30; drills, M W R F 8, or 2:30. Staff.

A thorough grounding is given in all the language skills: listening, speaking, reading, and writing. Language practice is in small groups. Lectures cover grammar, reading, and cultural information.

123 Continuing Russian Fall. 4 credits. Limited to students who have previously studied Russian and have a CPT achievement score between 450 and 559. Satisfactory completion of Russian 123 fulfills the qualification portion of the language requirements.

M–F 3:35. Staff.

A prequalification course designed to prepare students for study at the 200 level. Passing this course is equivalent to qualification.

203–204 Composition and Conversation 203, fall; 204, spring. 3 credits each term. Prerequisite: qualification in Russian. Prerequisite for Russian 204: 203 or equivalent.

Drills, M W R F 11:15 or 1:25. R. L. Leed and staff.

Guided conversation, composition, reading, pronunciation, and grammar review, emphasizing the development of accurate and idiomatic expression in the language.

Note: Students placed in 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 respective literature departments and the 203–204 language courses by the Department of Modern Languages and Linguistics.

[301–302 Advanced Russian Morphology and Syntax] 301, fall; 302, spring. 4 credits each term. Prerequisite for Russian 301: 204 or equivalent. Prerequisite for 302: 301. L. H. Babby. Not offered 1981–82. Next offered 1982–83.

This course is intended to increase the student's active command of Russian syntactic constructions and vocabulary.]

303–304 Advanced Composition and Conversation 303, fall; 304, spring. 4 credits each term. Prerequisite for Russian 303: 204 or equivalent. Prerequisite for Russian 304: 303 or equivalent. M W F 12:20. J. Bosky.

305–306 Directed Individual Study 305, fall; 306, spring. 2 credits. Prerequisite for Russian 305: 303–304 or equivalent. Prerequisite for Russian 306: 305.

Hours to be arranged. J. Bosky.

This is a practical language course on an advanced level and is designed to improve oral control of colloquial Russian.

[401–402 History of the Russian Language] 401, fall; 402, spring. 4 credits each term. Prerequisite for 401 is qualification in Russian. First term or equivalent is prerequisite to the second. Offered alternate years. Not offered 1981–82.

L. H. Babby.
Phonological, morphological, and syntactic developments from Proto-Slavic to modern Russian.]

403-404 Linguistic Structure of Russian 403, fall; 404, spring. 4 credits each term. Prerequisite for Russian 403: qualification in Russian; Linguistics 101-102 recommended. Prerequisite for Russian 404: 403 or equivalent. Offered alternate years.

Hours to be arranged. L. H. Babby.
A synchronic study and analysis of Russian linguistic structure. Russian 403 deals primarily with phonology and morphology and 404 with syntax.

601 Old Church Slavic Fall. 4 credits. This course is prerequisite to Russian 602. Offered alternate years.

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.
Hours to be arranged. L. H. Babby.
Structural analysis of Old Russian, and close reading of texts.

[700 Seminar in Slavic Linguistics Offered according to demand. Variable credit. Not offered 1981-82.

Staff.
Topics chosen according to the interests of staff and students.]

Literature Courses

Courses in English Translation

103 Freshman Seminar: Classics of Russian Thought and Literature Fall and spring. 3 credits each term.

M W F 11:15 or T R 2:30-3:45. 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 9:05 or 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 Spring. 3 credits.

M W F 9:05. 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 1981-82.]

307 Themes from Russian Culture Fall. 4 credits.

M W F 1:25. C. Emerson.
Russian is a difficult culture to understand in part because it has had, at least until the twentieth century, two cultures: a Westernized elite and a conservative Orthodox peasantry. Many of the greatest works of Russian culture are attempts to bring these two cultures together—Tolstoy and Dostoevsky in literature, Mussorgsky in music, Repin in visual arts. To appreciate this great flowering of Russian culture in the nineteenth century, some understanding of the traditional values of Old Russia (and the transitional values of New Russia) is essential. This course looks at the visual art of ancient Muscovy, the lives of its saints, the image of the city (Petersburg), and the cultural crisis which resulted from the collision of East with West. Developments in

music are included if students express an interest. Works of moderate length by Pushkin, Gogol, Dostoevsky, Tolstoy, and Chekhov are read as cultural artifacts—with the goal of determining, by the end of the course, what constitutes a "Russian theme."

308 Themes from Russian Culture Spring. 4 credits.

M W F 1:25. C. Emerson.
Continuation of 307 into the Soviet period, although either course may be taken separately. Themes include the liberating (and later enslaving) effect of the Revolution, the politicization of Russian literature, and "socialist realism" versus the realistic tradition of Tolstoy and Solzhenitsyn.

[314 Intellectual Background of Russian Literature, 1825-1930 Not offered 1981-82.]

330 The Soviet Union: Politics, Economics, and Culture (also Economics and Government 330) Fall. 4 credits.

T R 2:30-3:45. G. Gibian, D. Holloway, G. Staller.
Interdisciplinary survey of the USSR since the Revolution, with emphasis on contemporary developments.

332 Russian Theatre and Drama Fall. 4 credits. No Prerequisites.

T R 12:20-1:35. S. Senderovich.
A survey of Russian theatre and drama from the beginning to the present time. Reading and discussion of major plays. In English translation.

334 The Russian Short Story Spring. 4 credits.

There may be a section for Russian readers.
T R 12:20-1:35. A. Zholkovsky.
A survey of two centuries of Russian story telling. Emphasis on the analysis of individual stories by major writers, on narrative structure, and on related landmarks of Russian literary criticism. In English translation.

[350 Tolstoy and the Disciplines (also College Scholar 350) Not offered 1981-82.]

367 The Russian Novel Fall. 4 credits. Also open to graduate students. There will be a special discussion section for students who read Russian; if they are Russian majors, they may count the course as one in the original language.

T R 10:10 and a third hour to be arranged.
G. Gibian.
Study of the major Russian prose writers of the nineteenth and twentieth centuries. Novels and short stories by Gogol, Turgenev, Tolstoy, Dostoevsky, Chekhov, Solzhenitsyn, and others. In English translation.

368 Soviet Literature Spring. 4 credits.

T R 10:10 and a third hour to be arranged.
G. Gibian.
Selected works of Russian literature, 1917 to date, examined primarily as works of art, with some attention to their social, political, and historical importance. Mayakovsky, Babel, Pasternak, Solzhenitsyn, and others. In English translation.

369 Dostoevsky Spring. 4 credits. There may be an additional session for students who read Russian.

M W 12:20 and a third hour to be arranged.
N. Perlina.
The emphasis will be on the social, philosophical, cultural and poetic context of Dostoevsky's major works. Several general discussions will examine the central problems of Dostoevsky's writing. In English translation.

379 The Russian Connection (also Comparative Literature 379) Spring. 4 credits.

M W F 10:10. P. Carden.
Russian literature in its European context. We will discuss great works of the Russian prose tradition in their reciprocal relations with European prose. Among

the Russian works to be studied will be short stories by Pushkin, Gogol, Turgenev, and Chekhov, and Tolstoy's *War and Peace* and Dostoevsky's *The Idiot*. Among the European authors whose work helped to shape or was in some degree shaped by Russian literature, we will look at Sterne (*Tristram Shandy*), Hoffmann, Sand, Stendhal (*The Charterhouse of Parma*), and Maupassant. In English translation.

389 Modern Literature in Poland, Czechoslovakia, and Yugoslavia (also Comparative Literature 389) Spring. 4 credits.

T R 2:30-3:45. G. Gibian.
The course will focus on novels and short stories, but some consideration will also be given to drama and poetry. No knowledge of Eastern European languages is required; the reading will be done in English translation. Primary emphasis will be on the texts as literary works of art, but attention will also be given to historical and political backgrounds. Whenever possible, Eastern European films relating to work in the course will be shown.

[415 Fairytale and Narrative (also Comparative Literature 415) Not offered 1981-82.]

[493 Tolstoy's War and Peace and Children's Stories: Thematic Invariance and Plot Structure Not offered 1981-82.]

[498 The Age of Symbolism Not offered 1981-82.]

[499 Russian Modernism Not offered 1981-82.]

Courses in Russian

Of the courses listed below, the texts read are in Russian or the language of instruction is Russian, or both.

201-202 Readings in Russian Literature 201, fall; 202, spring. 3 credits each term. Prerequisite: qualification in Russian. Open to freshmen.

M W F 10:10. C. Emerson.
Designed as the first literature course taken entirely in Russian—both readings and class discussions. 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, fairytale, drama, narrative prose); to sample widely differing literary styles, and to accomplish both without recourse to English. Readings from the nineteenth-century masters: Pushkin, Gogol, Tolstoy, Dostoevsky, supplemented by twentieth-century poetry. Wherever 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*).

331 Russian Poetry Fall. 4 credits. Prerequisites: Russian 202 or the equivalent and permission of the instructor. This course may be counted towards the 12 credits of Russian literature in the original for the Russian major.

M W F 12:20. A. Zholkovsky.
A survey of Russian poetry with primary emphasis on analysis of individual poems by major poets.

[335 Gogol Not offered 1981-82.]

393 Honors Essay Tutorial Fall or spring. 4 credits.

Hours to be arranged. Staff.

431 Russian Prose Fiction Fall. 4 credits. Prerequisites: Russian 202 or the equivalent, and permission of instructor. This course may be counted towards the 12 credits of Russian literature in the original for the Russian major.

M W 2:30 and one hour to be arranged. P. Carden.
In 1981 we will focus on the shorter works of

Turgenev and Tolstoy: *Zapiski okhotnika*, *Asya*, *Rudin*, *Veshnye vody*, *Kazaki*, *Semeinoe schast'e*, and *Khadzhi Murad*. Reading in the original.

432 Pushkin Spring. 4 credits. Prerequisites: Russian 202 or equivalent, and permission of instructor. This course may be counted towards the 12 credits of Russian literature in the original for the Russian major.

M W 2:30 and one hour to be arranged.

S. Senderovich.

Reading in the original language and discussion of selected works by Pushkin: lyrics, narrative poems, prose, plays, and *Eugene Onegin*.

492 Supervised Reading in Russian Literature

Fall or spring. 2–4 credits each term.

Hours to be arranged. Staff.

Graduate Seminars

611 Supervised Reading and Research Fall or

spring. 2–4 credits each term. Prerequisite:

permission of the department.

Hours to be arranged. Staff.

617 Stylistics Fall. 4 credits. There will be a small charge for photocopied materials.

M W F 1:25. N. Perlina.

Advanced work on Russian style with an emphasis on practical application in spoken and written Russian and in translating. A variety of texts will be used from love poems to letters. The excerpts will provide material for practical work on levels of style in the language with emphasis on contemporary Russian style.

618 Russian Stylistics Spring. 4 credits. Taught in Russian.

W 4–6. S. Senderovich.

A continuation of Russian 617, though each course may be taken independently.

620 Studies in Modern Poetry Fall. 4 credits.

Open to seniors. Taught in Russian.

W 4–6. A. Zholkovsky.

A survey, discussion, and comparison of the poetic contribution of six major poets (Akhmatova, Cvetaeva, Esenin, Mandelstam, Mayakovsky, Pasternak). Emphasis on thematic, structural, and stylistic similarities and differences, and on subtleties of texture. In the original. There may be a section on poetic translation.

[621 Russian Literature from the Beginnings to 1700 Not offered 1981–82.]

[622 Eighteenth-Century Literature Not offered 1981–82.]

624 Russian Romanticism Fall. 4 credits. Taught in Russian.

T 4–6. S. Senderovich.

A survey of concepts, themes, genres, and main individual contributions in Russian literature of the Age of Romanticism.

[625 Russian Realism Not offered 1981–82.]

[671 Seminar in Nineteenth-Century Russian Literature Not offered 1981–82.]

[672 Seminar in Twentieth-Century Russian Literature Not offered 1981–82.]

701 Proseminar: Methods in Research and Criticism Spring. Variable credit: 4 credits for both extra session and Tuesday session; 3 credits for the Tuesday session only; 1 credit for the extra session only.

T 4–6 and one hour to be arranged. P. Carden and

A. Zholkovsky.

Intended to provide a foundation in scholarly

research techniques and critical methodologies, indispensable for independent work at the graduate level.

Tuesdays will be devoted to a survey of critical methods, Russian and Western, with discussion of their advantages and methodologies. The extra session, required of all graduate students who have not had a similar course, will concentrate on bibliography and the development of good research technique. Either session may be taken separately.

Related Courses in Other Departments

The Gothic Novel (Society for the Humanities 415) Fall. 4 credits.

R 1:25–3:10. R. Miller.

The Gothic novel should not be dismissed as pulp fiction dealing solely with "unspeakable terrors" and "dark labyrinths." Students will examine in these novels the merging of comic realism with fantasy, of the genuinely tragic with the sentimental, of the horrid with the beautiful. We shall consider the textual and historical reasons for the immense popular success of these novels, which were literally "read to pieces."

The Confession: Rhetoric and Morality (Society for the Humanities 416) Spring. 4 credits.

R 1:25–3:10. R. Miller.

Many writers (such as Diderot, Gogol, and Dostoevsky), recognizing the problematic nature of the confession, have made use of it to exploit and portray textual and moral paradoxes. Others (such as St. Augustine, Montaigne, Rousseau, and Tolstoy), who understood the double-edged nature of this genre, still undertook to find genuine expression within it. We shall study literary confessions (both fictional and autobiographical) from the standpoint of the audience—whether that audience is actual, fictive, or composed of some aspect of the author's own being.

Sanskrit

See Linguistics 641–642.

Serbo-Croatian

131–132 Elementary Course 131, fall; 132,

spring. 3 credits each term. Prerequisite for Serbo-Croatian 132: 131 or equivalent.

Hours to be arranged. E. W. Browne.

[133–134 Intermediate Course II 133, fall; 134, spring. 3 credits each term. Prerequisite for 133: 132 or equivalent. Prerequisite for 134: 133 or equivalent.

E. W. Browne. Not offered 1981–82.]

Sinhala (Sinhalese)

J. W. Gair

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Sinhala 102: 101 or equivalent.

Hours to be arranged. J. W. Gair.

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. Prerequisite for Sinhala 201: qualification in Sinhala. Prerequisite for Sinhala 202: 201 or equivalent.

Hours to be arranged. J. W. Gair.

203–204 Composition and Conversation 203, fall; 204, spring. 3 credits each term. Prerequisite for Sinhala 203: 202 or permission of instructor.

Prerequisite for Sinhala 204: 203 or equivalent.

Hours to be arranged. J. W. Gair.

Related Courses

See also Linguistics 341, 442, 631, 640, 641, 644.

Spanish

M. Suñer, director of undergraduate studies (language), 217 Morrill Hall, 256–4298; J. Tittler, director of undergraduate studies (literature), 269 Goldwin Smith Hall, 256–5038. U. J. DeWinter, J. W. Kronik, C. Moron-Arroyo, C. Piera, M. Randel, E. M. Santf, K. Vernon

The Major

The major is designed to give students proficiency in the oral and written language, to acquaint them with Hispanic culture, and to develop their skill in literary and linguistic analysis. Satisfactory completion of the major should enable students to meet language and literature requirements for teaching, to continue with graduate work in Spanish, or to satisfy standards for acceptance into the training programs of the government, social agencies, and business concerns. A Spanish major combined with another discipline may also allow a student to undertake preprofessional training for graduate study in law or medicine. Students interested in a Spanish major are encouraged to seek faculty advice as early as possible. For acceptance into the major, students should consult the director of undergraduate studies in Spanish, Professor Tittler (269 Goldwin Smith Hall), who will admit them to the major, and choose an adviser from the Spanish faculty of either the Department of Romance Studies or the Department of Modern Languages and Linguistics. Spanish majors will then work out a plan of study in consultation with their advisers. Previous training and interests, as well as vocational goals, will be taken into account when the student's program of courses is determined.

Spanish 201 and 204 (or 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) 303 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, Prof. 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.

Study abroad. 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).

Depending on the course, a small fee may be charged for copies of texts for course work.

Languages and Linguistics

121-122 Elementary Course 121, fall; 122, spring. 4 credits each term. Prerequisite for Spanish 121: 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.

Fall and spring: lec, R 12:20, R 2:30, F 11:15, or F 1:25; drills, M-R 8, 9:05, 10:10, 11:15, 12:20, 1:25, 2:30, 3:35. Evening prelims: fall, 7:30 p.m., Oct. 27; spring, 7:30 p.m., April 8. C. Piera and 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 11:15 or 1:25; drills, T-F 8, 9:05, 10:10, 11:15, 12:20, 1:25, or 2:30. Spring: lec, M 1:25; drills, T-F 9:05, 10:10, or 12:20. Evening prelims: fall, 7:30 p.m., Oct. 6, Nov. 10; spring, 7:30 p.m., March 2, April 13. 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. 8; spring, 7:30 p.m., March 2. Staff.

Conversational grammar review with special attention to the development of accurate and idiomatic oral expression. Includes readings in contemporary Spanish prose and practice in writing.

204 Intermediate Composition and Conversation

Fall or spring. 3 credits. Prerequisite: Spanish 203 or 212, 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. Evening prelims: fall, 7:30 p.m. Oct. 27; spring, 7:30 p.m., March 16. 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.

303 Advanced Composition and Conversation

Fall. 4 credits. Prerequisite: Spanish 204 or equivalent.

M W F 10:10, 11:15. M. Suñer and staff. Advanced course in grammar, composition, and conversation. Special attention to the fundamental aspects of language styles through the analysis of contemporary spoken and written Spanish.

310 Advanced Conversation and Pronunciation

Spring. 2 credits. Prerequisite: Spanish 204 or equivalent.

M W F 9:05. Staff.

312 Advanced Composition

Spring. 4 credits. Prerequisite: Spanish 201 or 204 or 212 or equivalent. Required of Spanish majors.

M W F 11:15. Staff.

This course aims at developing the student's analytical writing skills, vocabulary, and reading ability through the detailed analysis of selected contemporary texts, weekly translations, and essays in Spanish. Special consideration will be given to the problems of stylistics.

401-402 History of the Spanish Language

401, fall; 402, spring. 4 credits each term. Prerequisites: Linguistics 101 and qualification in Spanish, or permission of the instructor.

T R 10:10-11:25. 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 9:05. 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. Not offered 1981-82.

M W F 11:15. M. Suñer.

Survey of the salient morphological and syntactic characteristics of contemporary Spanish.]

601 Hispanic Dialectology

Fall. 4 credits.

According to demand.

Hours to be arranged. M. Suñer.

Survey of dialects to Latin America and the Caribbean.

602 Linguistic Structure of Ibero-Romance

Fall or spring according to demand. 4 credits.

M 2:30-4:30. C. Piera.

Phonological, morphological, and syntactic characteristics of the Romance languages (Catalan, Galician, Portuguese, Dzhudezmo) and main dialects of the Iberian Peninsula, studies in relation to each other and to Castilian Spanish.

603 Contemporary Theories of Spanish

Phonology Fall or spring according to demand. 4 credits.

Hours to be arranged. M. Suñer.

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

108 Freshman Seminar: The Reader in Fiction

Spring. 3 credits.

M W F 11:15. K. Vernon.

Devoted to an examination of the image of the reader and the act of reading and their implications for our own reading experience in classic and contemporary texts. Works in translation by Cervantes, Fielding, Nabokov, Cortázar, and others.

201 Introduction to Hispanic Literature Fall or spring. 3 credits. Prerequisite: qualification in Spanish or permission of instructor. Conducted mainly in Spanish. (The literature course that normally follows 201 is 315, 316, or 317.)

Fall: M W F 9:05, 10:10, 12:20 or T R 10:10-11:25;

J. Tittler and staff. Spring: M W F 9:05, 10:10, or 12:20-1:35; staff.

An intermediate reading course in which texts from Spain and Spanish America are read and analyzed. The course is designed to increase reading and speaking facility in Spanish and to develop critical and analytical skills in the appreciation of literary texts.

[313 Spanish Civilization Not offered 1981-82; next offered fall 1982.]

Note: Spanish 315, 316 and 317 can be taken in any order.

315 Readings in Sixteenth- and

Seventeenth-Century Hispanic Literature Fall. 4 credits. Prerequisite: Spanish 201 or four years of high school Spanish or permission of instructor. This course is not a prerequisite for Spanish 316 or 317.

M W F 9:05. M. Randel.

Readings and discussion of representative texts of the period from both Spain and her colonies in the New World: Garcilaso de la Vega, *Lazarillo de Tormes*, San Juan de la Cruz, Cervantes, Lope de Vega, Calderón, and others.

316 Readings in Modern Spanish Literature

Fall. 4 credits. Prerequisite: Spanish 201 or four years of high school Spanish or permission of instructor.

M W F 10:10; K. Vernon. T R 12:20; J. Kronik.

Readings and discussion of representative texts from Spain from the Romantic period to the present: Zorrilla, Galdos, Unamuno, Garcia Lorca, and others.

317 Readings in Spanish-American Literature

Spring. 4 credits.

M W F 10:10. J. Tittler. T R 10:10; Staff.

Reading and discussion of representative texts of the nineteenth and twentieth centuries from Spanish America: Dario, Neruda, Borges, Paz. Garcia Márquez, Cortázar, and others.

323 Readings in Latin American Civilization

Fall. 4 credits.

M W F 12:20. E. Santí. Readings and discussion in Spanish.

A study of the major periods of Latin American political, intellectual, and art history.

Note: The prerequisite for the following courses, unless otherwise indicated, is Spanish 315 or 316 or 317 or permission of instructor.

331 The Modern Drama in Spanish America

Fall. 4 credits.

T R 2:30-3:45. J. Kronik.

A study of significant plays from several Spanish American countries, 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.

[332 Modern Drama in Spanish America Not offered 1981-82.]

[333 The Spanish-American Short Story Not offered 1981-82; next offered 1982-83.]

335 The New Latin-American Narrative in Translation (also Comparative Literature 335 and General Education 335) Fall. 4 credits.

T R 12:20-1:35. J. Tittler.

Reading and discussion of texts—in Spanish or English translation—recognized to belong to the vanguard of modern fiction. Authors studied will include Borges, Cabrera Infante, Cortázar, Donoso, Fuentes, Garcia Márquez, Puig, Vargas Llosa.

[336 Popular Culture in Contemporary Spanish-American Prose Fiction] Not offered 1981–82; next offered 1982–83.]

[351 Spanish Drama of the Golden Age] Not offered 1981–82.]

[355 The Picaresque Novel in a European Perspective (also Comparative Literature 355)] Not offered 1981–82.]

[356 Spanish Lyric Poetry of the Golden Age] Not offered 1981–82.]

[368 The Birth of the Novel in Spain: Toward Don Quixote] Not offered 1981–82.]

[386 The Nineteenth-Century Spanish Novel] Not offered 1981–82.]

[389 Form and Formlessness in the Novel of the Generation of 1898] Not offered 1981–82.]

[390 Sociology and Literature in Twentieth-Century Spain] Not offered 1981–82; next offered spring 1983.]

[391 The Post-Civil War Drama in Spain] Not offered 1981–82.]

394 Art and Politics in Latin America Spring. 4 credits. Readings in Spanish or English.
M W F 1:25. K. Vernon.
This interdisciplinary course will consider various forms of politically charged art: works by writers such as Neruda and Cortázar; paintings by artists of the Mexican muralist movement; and documentary and pseudo documentary film. We shall attempt to characterize such art in an age whose aesthetic holds that art, at least good art, should be "pure." We shall examine the artistic techniques, the rhetoric of these works in contrast with those of "nonpolitical" works with an eye to exploring the boundaries between legitimate persuasion and propaganda. Thirdly, we shall contrast contemporary, "self-conscious" political art with an earlier tradition of regionalism and social realism.

[395 The Contemporary Novel in Spain] Spring. 4 credits. Not offered 1981–82.]

396 Modern Latin American Poetry in Translation (also Comparative Literature 396) Fall. 4 credits.
M W 2:30–3:45. E. Santil.
A general introduction to this century's leading Latin American poets—Borges, Vallejo, Neruda, Paz, and Cardenal. The course does not require background in Spanish or any particular sophistication in poetry. Readings will be done in bilingual editions. Discussion will be in English, but an extra session for majors and graduate students will be arranged.

[398 Modern Hispanic Poetry] Not offered 1981–82.]

400 The Contemporary Spanish-American Novel Spring. 4 credits.
W 2:30–4:30. J. Tittler.

An investigation into the fiction of two leading Spanish-American novelists of our day—Guillermo Cabrera Infante and Manuel Puig—and critical responses to their works. Readings will be coordinated with residencies by the authors during the 1981–82 festival of Ibero-American culture at Cornell.

419–420 Special Topics in Hispanic Literature 419, fall; 420, spring. 2–4 credits each term.
Prerequisite: permission of instructor.
Staff.
Guided independent study of specific topics. For undergraduates interested in special problems not covered in courses.

429–430 Honors Work in Hispanic Literature 429, fall; 430, spring. 4 credits each term. Limited to seniors. Prerequisite: permission of instructor.
Staff.

[439 Medieval Literature] Not offered 1981–82.]

[441 Medieval Literature 1300–1508] Not offered 1981–82; next offered 1983–84.]

[446 The Early Spanish Love Lyric: Origins to 1700] Not offered 1981–82.]

457 Readings from Don Quixote's Library (also Comparative Literature 358) Fall. 4 credits.
M W F 11:15. M. Randel.
A "new scrutiny" of major works from the late Middle Ages and the sixteenth century, including both those judged at the famous bookburning and those regularly quoted in the novel by the Knight. Texts studied will include *Amadís de Gaula*, *La Celestina*, *Orlando furioso* (in translation), romances, epic and pastoral literature. The course will seek to throw light on Cervantes' theory of the novel and on his concrete practice of parody. Prior knowledge of the *Quijote* useful but not required.

[459 Being, God, Mind: Humanistic Revolutions from Plato and Vico (also Romance Studies 459 and Comparative Literature 359)] Not offered 1981–82; next offered fall 1982.]

[461 The Rhetoric of Honor] Not offered 1981–82.]

466 Cervantes: Don Quixote Spring. 4 credits.
T R 10:10–11:25. C. Arroyo.
A reading of this novel with two questions in mind: what does make it worthy of reading as a work of art, and as an experiment in human communication.

[479 Colonial Spanish-American Literature] Not offered 1981–82; next offered 1982–83.]

[481 Eighteenth- and Nineteenth-Century Spanish Drama] Not offered 1981–82; next offered 1982–83.]

[489 Hispanic Romanticism] Not offered 1981–82; next offered 1982–83.]

639–640 Special Topics in Hispanic Literature 639, fall; 640, spring. 4 credits each term. To be taken by all new graduate students.
Staff.

[689 Carlos Fuentes] Not offered 1981–82; next offered fall 1982.]

[699 Ortega y Gasset's *The Dehumanization of Art and Ideas of the Novel* (1925) (also Comparative Literature 690)] Not offered 1981–82.]

Related Courses in Other Departments

The Novella in World Literature (Comparative Literature 414)

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: 101.
Hours to be arranged. J. U. Wolff.

201–202 Tagalog Reading 201, fall; 202, spring. 3 credits each term. Prerequisite for Tagalog 201: 102 or equivalent. Prerequisite for Tagalog 202: 201 or equivalent.
Hours to be arranged. J. U. Wolff.

300 Linguistic Structure of Tagalog Fall or spring. 4 credits. Prerequisite: Linguistics 101. 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: 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: 101 or equivalent.
Hours to be arranged. G. Kelley.

[201–202 Telugu Reading] 201, fall; 202, spring. 3 credits each term. Prerequisite for Telugu 201: qualification in Telugu. Prerequisite for Telugu 202: 201 or equivalent. G. Kelley. Not offered 1981–82.]
See also Linguistics 341, 440, 646.

Thai

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Thai 102: 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. Prerequisite for Thai 201: qualification in Thai. Prerequisite for Thai 202: 201 or equivalent.
M W F 2:30. R. B. Jones, Jr.

203–204 Composition and Conversation 203, fall; 204, spring. 3 credits each term. Prerequisite for Thai 203: qualification in Thai. Prerequisite for Thai 204: 203.

301–302 Advanced Thai 301, fall; 302, spring. 4 credits each term. Prerequisite: Thai 201–202, or equivalent.
M W F 1:25. R. B. Jones, Jr.
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 the equivalent.
Hours to be arranged. R. B. Jones, Jr.
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.

Ukrainian

131–132 Elementary Course 131, fall; 132, spring. 3 credits each term. Prerequisite for Ukrainian 132: 131 or equivalent.
Hours to be arranged. E. W. Browne.

Vietnamese

101–102 Elementary Course 101, fall; 102, spring. 6 credits each term. Prerequisite for Vietnamese 102: 101 or equivalent. Intended for beginners or students placed by examination.
Hours to be arranged. F. E. Huffman.
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

201-202 Vietnamese Reading 201, fall; 202, spring. 3 credits each term. Prerequisite for Vietnamese 201: qualification in Vietnamese. Prerequisite for Vietnamese 202: 201. Hours to be arranged. F. E. Huffman.

203-204 Composition and Conversation 203, fall; 204, spring. 3 credits each term. Prerequisite for Vietnamese 203: qualification in Vietnamese. Prerequisite for Vietnamese 204: 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.

303-304 Vietnamese Literature 303, fall; 304, spring. 4 credits each term. Prerequisite: Vietnamese 301-302 or equivalent. Hours to be arranged. F. E. Huffman. Reading of selections from contemporary literature.

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.

Music

J. Webster, chairman; S. Monosoff, director of undergraduate studies, 224 Lincoln Hall, 256-5206. W. W. Austin, C. A. Barbera, M. Bilson, C. Greenspan, M. Hatch, J. Hsu, K. Husa, M. Keller, E. Murray, D. R. M. Paterson, D. M. Randel, T. A. Sokol, M. W. Stith, S. Stucky, B. Troxell, N. Zaslav

Musical Performance and Concerts

Musical performance is an integral part of Cornell's cultural life, and an essential part of its undergraduate academic programs in music. The department encourages music making through its offerings in individual instruction and through musical organizations and ensembles, which are directed and trained by members of the faculty. Students from all colleges and departments of the University join with music majors in all of these ensembles:

Cornell Symphony Orchestra
Cornell Chamber Orchestra
Cornell Symphonic Band
Cornell Wind Ensemble
Small wind and brass ensembles
Collegium Musicum
Cornell Eighteenth-Century Orchestra
Cornell Gamelan Ensemble
Chamber music ensembles
Cornell Chorus
Cornell Glee Club
Chamber Singers
Sage Chapel Choir

Information about requirements, rehearsal hours, and conditions for academic credit can be found in the following listings for the Department of Music. Announcements of auditions are posted during registration each fall term and, where appropriate, each spring term as well. The department office (125 Lincoln Hall, 256-4097) can always supply up-to-date information.

The Department of Music and the Faculty Committee on Music sponsor nearly 100 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; further information is available from the department office.

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 Sonya Monosoff, 224 Lincoln Hall (256-5206).

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, which permits relatively extensive election of courses in other fields. 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 department office, 125 Lincoln Hall (256-4097); from the director of undergraduate studies, Professor Sonya Monosoff, 224 Lincoln Hall (256-5206); 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) Music theory:
 - (a) Music 251-252 and 351-352;
 - (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) 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) Performance: four semesters of participation in a musical organization or ensemble.

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:
 - (i) 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);
 - (ii) 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:
 - (i) for two of the four semesters of participation in a musical organization or ensemble, Music 462 or 463 may be substituted;
 - (ii) twelve additional credits in this area 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.
- (c) in music history:
 - (i) for two of the four semesters of participation in a musical organization or ensemble, Music 462 or 463 may be substituted;
 - (ii) twelve additional credits in this area 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 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 Bösendorfer Imperial. There is an Aeolian-Skinner organ in Sage Chapel, a Schicker organ at Barnes Hall, and a Helmuth Wolff organ in Anabel Taylor Chapel. A studio for electronic music is housed in Lincoln Hall.

Freshman Seminars

111 Sound, Sense, and Ideas Fall or spring. 3 credits. Each section limited to 20 students. No prerequisites; students do not need to have studied music.

Fall: sec 1: M W F 9:05, C. Greenspan; sec 2: M W F 10:10, P. Horsley; sec 3: M W F 11:15, C. Eisen.

Spring: sec 1: M W F 10:10, P. Horsley; sec 2: M W F 11:15, C. Eisen.

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.

114 Contemporary Music Spring. 3 credits. Limited to 20 students. No prerequisites; students do not need to have studied music.

M W F 2:30. W. W. Austin.

Listening, discussing, and writing about music which has been newly created in several different traditions, including rock, avant-garde "classical" music, and country and western. Readings in music criticism, and a good deal of writing of it. Students will also investigate one style of their own choosing in considerable detail. When possible, we will listen to performances of new music in the Ithaca area.

Introductory Courses

101 (formerly 213) The Art of Music Fall. 3 credits.

T R 11:15; 1-hour disc to be arranged. W. W. Austin. Explorations, chiefly through study of phonograph records, designed to speed up the continuing development of various independent tastes. Each student chooses individually what to study from among diverse styles of music; instructors help refine these choices through the term; everyone studies a few assigned works, especially by J. S. Bach, Ludwig van Beethoven, and Béla Bartók, to provide a common focus for tracing and discussing historical continuities and changes. Diversity is represented in the lectures by live performances as well as recordings. The lectures are organized to survey melody, rhythms, chords, and musical forms, suggesting ways to study any music—beyond the course as well as within it.

103 (formerly 101) Introduction to the Musics of the World Spring. 3 credits.

T R 10:10; disc to be arranged. M. Hatch. The elements of music as they present themselves in folk, popular, and art musics, both in the West and in other cultural areas, especially Africa and Southeast Asia. Topics include pitch, scale, rhythm, meter, timbre, and forms of instrumental and vocal play with sound. Listening to and analyzing live and recorded musics.

105–106 (formerly 141–142) 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; disc to be arranged. M. Hatch. 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.

122 Elementary Musicianship Spring. 2 credits. Prerequisite: permission of instructor. A final grade of B– in Music 122, with failure in no individual component satisfies the prerequisite for Music 151.

Hours to be arranged. Staff. Designed primarily to prepare freshmen and others who wish to enroll in Music 151 to meet its prerequisite in practical musicianship. May not be counted for distribution in the expressive arts. Intensive drill in matching pitches, singing melodies at sight, melodic dictation, harmonic progressions at the keyboard, and reading treble and bass clefs together.

Music Theory

151–152 Elementary Tonal Theory 151, fall; 152, spring. 5 credits each term. Prerequisites for Music 151: a knowledge of the rudiments of music and some ability to perform; demonstration of adequate background and ability 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. S. Stucky 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.

2 disc hours to be arranged. M. Hatch. Readings, listening, and concentrated instruction in the literature, recordings, repertoires, and practices of Indonesian gamelan traditions. Related aspects of culture—drama, dance, literature, and oral poetry—will be studied in their influence on musical practice. Research into performance styles and the history of instruments. Fall 1981: West Javanese (Sundanese) gamelan for masked dance (*topeng*).

251–252 Intermediate Tonal Theory 251, fall; 252, spring. 5 credits each term. Prerequisite for Music 251: 152 or the equivalent, or a suitable level of performance on a proficiency test given by the department during orientation each fall term. Prerequisite for Music 252: 251.

M W F 10:10; 2 disc hours to be arranged. 251: D. R. M. Patterson; 252: S. Neff. 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 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 the equivalent.

M W F 9:05. E. Murray. 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. E. Murray. 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 Bartók, Hindemith, Schoenberg, Stravinsky, Webern, and some American composers. Writing assignments in various styles.

[451 Counterpoint Spring. 4 credits. Prerequisite: Music 351 or equivalent. Not offered 1981–82.]

452 Form and Analysis Spring. 4 credits.

Prerequisite: Music 351 or equivalent.

M W F 10:10. D. R. M. Paterson. Systematic study of the principles of form in tonal music, and of some of the major formal types: binary, ternary, variations, ritornello-based forms, rondo, and sonata form and its allies.

456 Orchestration Spring. 4 credits. Prerequisite: Music 351 or equivalent.

T 10:10–12:05. K. Husa. A study of the instruments of the orchestra and their use in representative works from 1700 to the present. Scoring for various instrumental groups including large orchestra. Students will occasionally attend rehearsals of Cornell musical organizations and ensembles.

460 Electronic Music Composition Spring. 3 credits. Limited to 10 students. Prerequisites: Music 252 and permission of instructor.

M 1:25–4:25. M. W. Stith and staff. 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 electronic music composers and readings from current literature are studied. Students are allotted 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 the Cornell orchestra, wind ensemble, and choruses.

[463 Choral Conducting Spring. 2 credits. Prerequisite: Music 252 or permission of instructor. F 2:30–4:10. T. A. Sokol. Not offered 1981–82.]

[464 Choral Style Spring. 2 credits. Prerequisite: Music 352 or permission of instructor. F 2:30–4:10. T. A. Sokol. Not offered 1981–82.]

Music History

218 Chopin, Chalkovski, Musorgskii Spring. 3 credits. Students may wish to register concurrently in Music 219.

T R 11:15; disc to be arranged. W. W. Austin, G. Gibian, and staff. Chief works of the three composers, including symphonies, concertos, and operas, are studied through phonograph records. Piano music and chamber music are presented in live performance. The biographical, social, and intellectual contexts of the music are considered in relation to concerns of the present. Students' essays may deal with such concerns more than any technical aspect of the music, though techniques are not neglected.

219 Chopin, Chalkovski, Musorgskii Spring. 1 credit. Prerequisite: reading knowledge of Russian. Limited to students concurrently enrolled in Music 218.

Seminar to be arranged. See course description for Music 218.

[220 History of Jazz] Spring. 3 credits. M W F 11:15. C. A. Barbera. Not offered 1981–82.]

221 Popular Music Fall. 3 credits. Prerequisite: any course in music or permission of the instructor. M W F 12:20. C. A. Barbera.
Topics vary from year to year, and may include: popular song in the United States in the nineteenth century; blues; the relations between blues and jazz, and popular music; "urban music" around the world; popular musics in their social contexts. Fall 1981: Mutual influences between pop and jazz in the 1940s and 1950s.

[274 (formerly 214) Opera] Spring. 3 credits. T R 11:15. C. Greenspan. Not offered 1981–82.]

[277 (formerly 318) Baroque Instrumental Music] Fall. 3 credits. Prerequisite: a course in music history or music theory, or permission of instructor. Not offered 1981–82.]

281 Music of the Baroque Period Fall or spring, every third semester. 3 credits. Prerequisite: any course in music, or consent of the instructor.
Fall 1981: M W 2:30. C. A. Barbera.
The history of music from the appearance of monody, opera, and the continuo around 1600 to the culmination of Baroque style in the music of Bach, Handel, and their contemporaries. Emphasis on the music of Monteverdi, Schütz, Purcell, Bach, and Handel.

282 Music of the Classical Period Fall or spring, every third semester. 3 credits. Prerequisite: any course in music, or consent of the instructor.
Spring 1982: M W 2:30. C. Greenspan.
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, sacred 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 course in music, or consent of the instructor. M W F 11:15. J. Webster. Not offered 1981–82.]

369 Debussy to the Present Fall. 4 credits. Prerequisite: Music 152, or consent of the instructors. M W F 11:15. W. W. Austin and 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, 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 (formerly 317) Music and Poetry in France: Late Middle Ages and Renaissance (also French 617)] Fall. 4 credits. D. M. Randel and E. P. Morris. Not offered 1981–82.]

[377 (formerly 387) Mozart: His Life, Works, and Times (also German 387)] Fall. 4 credits. N. Zaslav, S. L. Gilman. Not offered 1981–82.]

381 Music of the Baroque Period Fall or spring, every third semester. 4 credits. Prerequisite: Music 152 or equivalent.
Fall 1981: M W F 11:15. C. A. Barbera.
The same as Music 281, but with one additional meeting a 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 1982: M W F 11:15. C. Greenspan.
The same as Music 282, but with one additional meeting a 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. M W F 11:15. J. Webster. Not offered 1981–82.]

[389 The Study of Non-Western Musics] Fall. 4 credits. Prerequisite: Music 152 or permission of the instructor. T R 2:30; 1 disc hour to be arranged. M. Hatch. Not offered 1981–82.]

[474 (formerly 426) Poetry and Music in the English Renaissance (also English 426)] Spring. 4 credits. M W F 12:20. E. Murray and B. Rosecrance. Not offered 1981–82.]

[481 Music in Western Europe to Josquin Des Pres] Fall. 4 credits. Prerequisite: Music 381, 382, or 383, or permission of instructor. T R 10:10–11:25. D. M. Randel. Not offered 1981–82.]

[482 Josquin Des Pres to Monteverdi] Spring. 4 credits. Prerequisite: Music 381, 382, or 383, or permission of instructor. M W F 11:15. D. M. Randel. Not offered 1981–82.]

Independent Study

301–302 Independent Study in Music 301, fall; 302, spring. Prerequisite: departmental approval. Hours and credits to be arranged. Staff.

The Honors Program

401–402 Honors in Music 401, fall; 402, spring. 4 credits each term. Limited to honors candidates in their senior year. Staff.

Musical Performance

321–322 Individual Instruction in Voice, Organ, Harpsichord, Piano; String, Woodwind, and Brass Instruments; and Guitar Prerequisite: successful audition with the instructor. The number of places is strictly limited. Students may register only with the prior permission of the instructor. For more information, consult the department office, 125 Lincoln Hall, 256–4097.

Without credit: basic fee for one half-hour lesson weekly during one term, \$90; fees for a practice schedule of six hours weekly during one term: \$45 for the use of a pipe organ, \$22 for a practice room with piano, \$7 for a practice room without piano.

For credit: Music 321–322 may be taken for credit only by advanced students, at the sole discretion of the instructor. One one-hour lesson weekly (or two half-hour lessons) and a double practice schedule earn 2 credits each term, provided that the student has earned, or is earning, at least 3 credits in introductory courses (except Music 122), music theory, or music history for every 4 credits in Music 321–322 (except that the first 3 academic credits must be earned prior to or simultaneously with the first 2 credits in 321–322). The basic fees are multiplied by one and one-half (lesson fee becomes \$135; practice fees \$67, \$33, or \$10).

All fees are non-refundable once classes begin, even if registration is subsequently cancelled by the student. A student may register for this course in successive years. A member of a Cornell musical organization or ensemble receives a scholarship of one-half the lesson fee, when the lessons are taken in the student's primary performing medium. The

Department of Music offers a limited number of additional partial scholarships for lesson fees for cases of both need and special merit.

Students who wish to study instruments not taught at Cornell, or who because of limitations of space cannot be admitted to Music 321–322, may, under certain conditions, receive credit for performance study outside Cornell by registering for Music 321h–322h.

321a–322a Individual Instruction in Voice 321a, fall; 322a, spring. 2 credits each term. Hours to be arranged. B. Troxell.

321b–322b Individual Instruction in Organ 321b, fall; 322b, spring. 2 credits each term. Hours to be arranged. D. R. M. Paterson.

321c–322c Individual Instruction in Piano 321c, fall; 322c, spring. 2 credits each term. Hours to be arranged. M. Bilson and staff.

321d–322d Individual Instruction in Harpsichord 321d, fall; 322d, spring. 2 credits each term. Hours to be arranged. D. R. M. Paterson.

321e–322e Individual Instruction in Violin or Viola 321e, fall; 322e, spring. 2 credits each term. Hours to be arranged. S. Monosoff.

321f–322f Individual Instruction in Cello or Viola da Gamba 321f, fall; 322f, spring. 2 credits each term. Hours to be arranged. J. Hsu.

321g–322g Individual Instruction in Brass 321g, fall; 322g, spring. 2 credits each term. Hours to be arranged. M. W. 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, Lincoln Hall 125, 256–4097.

391–392 Advanced Individual Instruction 391, fall; 392, spring. 4 credits each term. Open only to juniors and seniors who are majoring under Option II with concentration in performance, and to graduate students. 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 1 credit. No audition for admission. M 7–8:30 p.m., R 7–8:30 p.m., Sunday 9:30 a.m. D. R. M. Paterson.

333–334 Cornell Chorus or Glee Club 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 1 credit. Prerequisite: permission of the instructor. Chamber orchestra limited to more experienced players.

Rehearsals for the Cornell Symphony Orchestra: full orchestra, W 7:30-10 p.m.; sectional rehearsals, alternate T or R 7:30-10 p.m.
Rehearsals for the Cornell Chamber Orchestra, R 7:30-10 p.m. E. Murray.

337-338 University Bands 1 credit. Prerequisite: permission of instructor.

Symphonic band: fall or spring, T W 4:30-5:45 p.m. Wind ensemble: fall, M 7:30-9:30 p.m.; spring, M 7:30-9:30 p.m., R 4:30-5:45 p.m. M. W. Smith.

Students interested in participating in the Big Red Marching Band should inquire at the Department of Athletics, Teagle Hall.

441-442 Chamber Music Ensemble 1 credit. Prerequisite: permission of instructor.

S. Monosoff and staff.

Study and performance of chamber music literature; string and wind groups; piano trios and quartets, trio sonatas, et cetera. Emphasis on musical problems, with some practice in sight reading.

443-444 Chamber Singers 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 1 credit. No previous knowledge of music notation or experience in music performance necessary.

Full ensemble: R 7:30-10 p.m. Small group lessons: M W F 12:20-1:10. Attendance at all full rehearsals and one small group lesson a week required for credit. M. Hatch.

Basic performance techniques and theories of Javanese gamelan. Tape recordings of gamelan and elementary cypher notation are provided. Extensive instruction by native Indonesian musicians.

447-448 Collegium Musicum 1 credit.

Prerequisite: permission of instructor.

Hours to be arranged. J. Hsu.

Study and performance of medieval, Renaissance, and Baroque vocal and instrumental music, with recorders, crumhorns, sackbuts, viols, shawns, organ, harpsichord, and other early instruments.

449-450 Eighteenth-Century Orchestra 1 credit. Prerequisite: permission of instructor.

T 7:30-10 p.m. S. Monosoff.

Study and rehearsal of eighteenth-century works, using historical instruments and replicas, and of the attendant problems of performance practice. Public performances may be given.

Graduate Courses

Open to qualified undergraduates with permission of the instructor.

501 Introduction to Bibliography and Research

Fall. 4 credits. Prerequisites: reading knowledge of French and German, and familiarity with music theory and general music history.

M 1:30-4:25. M. A. Keller.

553 Topics in Theory and Analysis Fall. 4 credits.

M 1:30-4:25. S. Neff.

Advanced studies in musical analysis and the theory of music.

557-558 Composition 557, fall; 558, spring. 4 credits.

W 2:30-4:25. S. Stucky.

559-560 Composition 559, fall; 560, spring. 4 credits.

T 2:30-4:25. K. Husa.

569-570 Debussy to the Present 569, fall; 570, spring. 4 credits each term.

M W F 11:15; 1 disc hour to be arranged. 569:

W. W. Austin, with S. Stucky; 570: S. Stucky, with W. W. Austin.

569: Lectures and discussion of Music 369, supplemented by analytical and bibliographical studies appropriate for graduate students. 570: A continuation of 569, but with emphasis on analysis of individual works of recent music. No single or systematic analytical method is essayed; rather, each work studied is approached in its own terms, with opportunity to explore a variety of analytical techniques.

[573 Music and Poetry in France: Late Middle Ages and Renaissance (also Music 373 and French 517)] Fall. 4 credits. D. M. Randel and E. P. Morris. Not offered 1981-82.]

[577 Mozart: His Life, Works, and Times (also German 757)] Fall. 4 credits. N. Zaslav and S. L. Gilman. Not offered 1981-82.]

[578 Seminar on Richard Wagner (also German 682)] Spring. 4 credits. J. Webster. Not offered 1981-82.]

[580 Introduction to Ethnomusicology] Fall. 4 credits. M. Hatch. Not offered 1981-82.]

[581-582 Seminar in Medieval Music] 581, fall; 582, spring. 4 credits each term. 582: not offered 1981-82, but see 789 below.

581: R 1:30-4:25. C. A. Barbera.

Notation and style in polyphonic music to the early fifteenth century.

[583-584 Seminar in Renaissance Music] 583, fall; 584, spring. 4 credits each term. D. M. Randel. Not offered 1981-82.]

[585-586 Seminar in Baroque Music] 585, fall; 586, spring. 4 credits each term. N. Zaslav. Not offered 1981-82.]

[587-588 Seminar in Music of the Classical Period] 587, fall; 588, spring. 4 credits each term. Not offered 1981-82; see list of related courses in other departments, below.

587: W 1:25-4:25. J. Webster.]

[589-590 Seminar in Music of the Romantic Era] 589, fall; 590, spring. 4 credits each term. Not offered 1981-82.]

[591-592 Performance Practice] 591, fall; 592, spring. 4 credits each term. Not offered 1981-82; see list of related courses in other departments, below.]

594 Music Criticism Fall. 4 credits.

F 2:00-4:30. C. Greenspan.

The history of music criticism, especially since 1800; criticism as an aspect of the growth of a public of spectators; criticism as historical record; composer-critics (e.g., Berlioz, Schumann); author-critics (e.g., E.T.A. Hoffmann); present-day criticism; daily-journal criticism; "thought-pieces"; performance as criticism; the role of criticism in musicology.

[597-598 Independent Study and Research] Hours and credits to be arranged. Staff.]

785-786 History of Music Theory 785, fall; 786, spring. 4 credits each term.

W 1:30-4:25. J. Webster.

785: The problem of the modality of Renaissance polyphony and the rise of tonality; 786: Topics in music theory from 1600 to the early nineteenth century. Special attention will be devoted to concepts of musical bass and differing methods of projecting basses in musical compositions.

789 Liturgical Chant in the West Spring. 4 credits.

R 1:30-4:25. C. A. Barbera.

The origins and development of Christian monophonic chant.

Related Courses in Other Departments

The Interpretation of J. S. Bach's Keyboard Music (Society for the Humanities 428)

Music in Society in Western Europe in the Second Half of the Eighteenth Century (Society for the Humanities 423)

The Symphonies of Mozart (Society for the Humanities 424)

Near Eastern Studies

A. H. Bernstein, chairman; M. F. Collins, director of undergraduate studies, spring; D. S. Powers, director of undergraduate studies, fall. J. Cohen, R. S. Falkowitz, E. Kadar, C. Kronfeld, P. D. Molan, D. I. Owen, N. Scharf

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 which has had such an important impact on the development of our own civilization and which plays so vital a role in today's world community. The department's course offerings treat the Near East from ancient times to the modern period and emphasize methods of historical and literary analysis. Near Eastern studies also provides the basic courses in the Program of Jewish Studies.

The Major

The student who majors in Near Eastern Studies may concentrate in one of the following four areas:

- I. Near Eastern Languages and Literatures
- II. Ancient Near Eastern Studies
- III. Judaic Studies
- IV. Islamic 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):

- a. Qualification in one of the languages offered by the Department.
- b. Eight NES courses (which may include intermediate and advanced language courses).
- c. 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 field work on Cornell-sponsored projects in the Near East or recognized field schools in Israel may also qualify for course credit.

Honors. Candidates for the degree of Bachelor of Arts with honors in Near Eastern languages and literatures, Ancient Near Eastern studies, Judaic studies, or Islamic studies must fulfill the requirements of the appropriate major study and enroll in the honors course 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 Program of Jewish Studies offers students the opportunity to take a wide variety of courses in Jewish studies whose subjects are not represented in the Department of Near Eastern Studies. Students interested in planning a program in Jewish studies should consult the coordinator, Prof. J. Cohen.

Akkadian

333–334 Elementary Akkadian 333, fall; 334, spring. 4 credits each term.
T R 2:30–3:45. D. I. Owen.

An introduction to the Semitic language of the Akkadians and Babylonians of ancient Mesopotamia. Utilizing the inductive method, students are rapidly introduced to the grammar and the cuneiform writing system of Akkadian through selected readings in the Code of Hammurapi, the Descent of Ishtar, and the Annals of Sennacherib. Secondary readings on the history and culture of Mesopotamia provide the background for the study of the language. Knowledge of another Semitic language helpful but not essential.

[335 Readings in Akkadian Texts] Fall or spring. 3 credits. Not offered 1981–82.]

Arabic

111–112 Elementary Arabic 111, fall; 112, spring. 6 credits each term. Prerequisite for 112: 111 or permission of instructor.

M–F 11:15. Fall, D. S. Powers; spring, P. D. Molan. 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.

[113–114 The Spoken Arabic of Egypt] 113, fall; 114, spring. 6 credits each term. Not offered 1981–82.]

211–212 Intermediate Arabic 211, fall; 212, spring. 3 credits each term. Prerequisite for 211: one year of Arabic or permission of instructor. Prerequisite for 212: 211 or permission of instructor.

M W F 11:15. Fall, P. D. Molan; spring, D. S. Powers. The basic structures of literary Arabic are reviewed and reinforced. An appreciation for syntax is developed through readings in classical and modern texts.

[311–312 Advanced Arabic] 311, fall; 312, spring. 4 credits each term. Not offered 1981–82.]

419 Independent Study Fall or spring. Variable credit. Prerequisite: permission of instructor. Staff.

Aramaic

[238 Aramaic] Spring. 3 credits. Not offered 1981–82.]

Hebrew

101–102 Elementary Modern Hebrew 101, fall; 102, spring. 6 credits each term. Prerequisite for 102: 101 or permission of instructor. Satisfactory completion of 102 fulfills the qualification portion of the language requirement.

Sec 1, M–F 10:10; sec 2, M–F 11:15. N. Scharf. Sec 3, M–F 1:25 (for students with no Hebrew background); E. Kadar.

The fundamentals of modern Israeli Hebrew, emphasizing reading, writing, listening, and speaking skills. Small groups led by native Hebrew speakers are supplemented with work at the language laboratory.

[121–122 Elementary Classical Hebrew] 121, fall; 122, spring. 4 credits each term. Not offered 1981–82; next offered 1982–83.]

201–202 Intermediate Modern Hebrew 201, fall; 202, spring. 3 credits each term. Prerequisite for 201: 102 or permission of instructor. Prerequisite for 202: 201 or permission of instructor. Satisfactory completion of 202 fulfills the proficiency portion of the language requirement.

Sec 1, M W F 1:25 (for students who have completed NES 102 at Cornell); N. Scharf. Sec 2, T R 2:30–3:45 (for students who have received qualification in Hebrew from other institutions). E. Kadar.

Second-year modern Israeli Hebrew. Continued development of reading, writing, listening, and speaking skills. Review of grammar; readings from contemporary Israeli prose and poetry; guided conversation and composition. Small groups led by native Hebrew speakers are supplemented with work at the language laboratory.

[221 Readings in Classical Hebrew Literature] Fall. 3 credits. Not offered 1981–82.]

222 Readings in Classical Hebrew Literature Spring. 3 credits. Prerequisite: 201 or 221 or equivalent with permission of instructor. May be used as literature to satisfy the humanities distribution requirement. Satisfactory completion of 221–222 fulfills the language proficiency requirement in Classical Hebrew.

M W F 2:30. M. 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.

301–302 Advanced Modern Hebrew 301, fall; 302, spring. 4 credits each term. Prerequisite for 301: 202 or equivalent with permission of instructor; for 302: 301 or equivalent with permission of instructor. This sequence may be used as literature to fulfill the humanities distribution requirement.

M W F 1:25. C. Kronfeld. Advanced study of Hebrew through the analysis of literary texts and expository prose. This course employs a double perspective: the language is viewed through the literature and the literature through the language. Students will develop composition skills by studying language structures, idioms, and various registers of style.

409 Independent Study Fall or spring. Variable credit. Prerequisite: permission of instructor. Staff.

Turkish

[131–132 Introduction to the Turkish Language (also Turkish 121–122)] 131, fall; 132, spring. 3 credits each term. Not offered 1981–82.]

Ugaritic

[337 Ugaritic] Fall. 3 credits. Not offered 1981–82.]

Ancient Near Eastern Literature

Arabic Literature

251 Studies in the Popular and Courtly Literatures of the Islamic Middle East Fall. 3 credits.

M W F 2:30. P. D. Molan.

An undergraduate seminar examining the relation between courtly and popular literature, the course surveys the development of uniquely Islamic literary forms and their aesthetic appeal. Students will read Islamic literary texts in translation and consider them against the background of medieval and modern critical theories.

332 Ancient Near Eastern Literature Spring. 4 credits. Open to all students.
M W F 10:10. R. S. Falkowitz.

The classics of ancient Sumerian and Babylonian Literature, including the Epic of Gilgamesh and the Cosmology Enuma Elish. Readings in translation.

[336 Folklore in the Ancient Near East] Spring. 4 credits. Not offered 1981–82.]

Biblical Literature

[125 Freshman Seminar in Biblical Literature: Heroes and Heroines of the Bible] Fall. 3 credits. Not offered 1981–82; next offered 1982–83.]

[221–222 Readings in Classical Hebrew Literature]
See course description under Hebrew.]

225 Judaic Literature in Late Antiquity: Dead Sea Scrolls and Sectarian Literature Spring. 3 credits. Open to freshmen.

M W F 11:15. M. 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.

[291 Tradition and the Literary Imagination] Fall. 3 credits. Not offered 1981–82.
See 292 under Hebrew Literature.]

322 Undergraduate Seminar in Biblical Literature: Prophecy in Ancient Israel Spring. 4 credits. Prerequisite: one course in the Bible or literature.
M W F 3:35. M. Collins.

A study of the speeches of ancient Israel's famous rhetoricians (such as Amos, Hosea, Isaiah, Jeremiah, and Ezekiel). The focus is on major issues which the prophets address (the human state and divine rule, man and society, freedom and responsibility, war and peace, exile and restoration), and on the poetics and rhetorics of these texts as literature. All readings in English translation. Students have the option of reading the texts in Hebrew.

429 Independent Study Spring. Variable credit. Prerequisite: permission of instructor. M. Collins. M. Collins.

Rabbinic Literature

341 Evolution of Jewish Law Fall. 4 credits.
T 2–4:25. J. Cohen.

A survey of the most important stages in the development and recording of the Oral Law—beginning with the biblical period, extending through classical antiquity and the Middle Ages, and culminating with movements in contemporary Judaism—from both literary and historical perspectives. Texts to be studied (in translation) include: Midrash Halakhah, Mishnah, Talmud, Maimonides' Code of Jewish Law, and present-day rabbinic responsa. The background of each text and the entire process of the development of the Halakhah with all its cultural ramifications will be discussed.

[342 Biblical Interpretation in Rabbinic Literature] Spring. 4 credits. Not offered 1981–82.]

448 Independent Study Fall or spring. Variable credit. Prerequisite: permission of instructor. Staff.

Hebrew Literature

207 Modern Hebrew Literature in Translation: Modern Hebrew Poetry Fall. 3 credits. Open to freshmen.

M W F 3:35. C. Kronfeld.

The dominance of poetry in modern Hebrew literature will be explored against the background of aesthetic, cultural, and political trends, and in the context of influential developments in European and American poetry. Readings will include Bialik, Tchernichovski (neo-romanticism), Fogel, Shteynberg, Ben-Yitzhak (impressionism, expressionism), Alterman, Shlonsky, Goldberg (neo-symbolism), Amichai, Zach, Rabikovitsh (neo-imagism, postmodernism).

208 Modern Hebrew Literature in Translation: The Modern Hebrew Short Story Spring. 3 credits. Open to freshmen.

M W F 3:35. C. Kronfeld.

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 Mendelev, Peretz, Bialik, Brenner, Gnessin, Yizhar, Oz, Orpaz, and Yehoshua.

221–222 Readings in Classical Hebrew Literature See course description under Hebrew.

[292 The Hebrew Literary Imagination Spring. 3 credits. Not offered 1981–82. See 291 under Biblical Literature.]

301–302 Advanced Modern Hebrew See course description under Hebrew.

[303 Seminar in Modern Hebrew Literature: The Short Story Fall. 4 credits. Not offered 1981–82.]

[304 Seminar in Modern Hebrew Literature: The Novel Spring. 4 credits. Not offered 1981–82.]

[308 Agnon and Hazaz Spring. 4 credits. Not offered 1981–82.]

405 Metaphor, Modernism, and Cultural Context: The Use of Metaphor in Modernist Hebrew, Yiddish, English and American Poetry (also Comparative Literature 405) Spring. 4 credits. Prerequisite: a course in one of the following: Hebrew or Yiddish language or literature, English or comparative literature.

R 2–4:25. C. Kronfeld.

This course investigates the issue of the typical modernist metaphor against the background of interdisciplinary theories of metaphor. Examples are taken from three different literatures, and various branches of modernism are represented, such as: Hebrew anti-formulaic poetry, the Yiddish introspectives, English and American imagists, et cetera. Readings will include Fogel, Amichai, Glatstein, Sutzkever, Eliot, Stevens, Williams, and others. Discussions and readings in English; students will have the option of reading these texts in Hebrew and/or Yiddish.

408 Independent Study Fall or spring. Variable credit. Prerequisite: permission of instructor. C. Kronfeld.

Yiddish Language and Literature

[171–172 Elementary Yiddish 171, fall; 172, spring. 4 credits each term. Not offered 1981–82.]

[375 The Shtetl in Modern Yiddish Fiction in English Translation (also German Literature 375) Fall. 4 credits. Not offered 1981–82.]

[377 Topics in Yiddish Literature (also German Literature 377) Spring. 4 credits. Not offered 1981–82.]

405 Metaphor, Modernism, and Cultural Context: The Use of Metaphor in Modernist Hebrew, Yiddish, English, and American Poetry (also Comparative Literature 405)

See course description under Hebrew Literature.

479 Independent Study Fall or spring. Variable credit. Prerequisite: permission of instructor. C. Kronfeld.

Related Course in Another Department

[Yiddish Literature in Translation (German Literature 350) Not offered 1981–82.]

History of Ancient Near Eastern Civilizations

[361 Interconnections in the Eastern Mediterranean World in Antiquity Spring. 4 credits. Not offered 1981–82.]

362 The History and Archaeology of Ebla Spring. 4 credits. Prerequisite: Arkeo 100 or any introductory course in ancient history or archaeology.

T R 12:20–1:35. D. I. Owen.

The course will present a detailed survey of the history and archaeology of Ebla based on the latest archaeological and textual discoveries. The position of the kingdom of Ebla in the history and archaeology of the third millennium in the ancient Near East will be emphasized. Significant texts in Eblaite and Sumerian will be read in translation. The film, "The Royal Archives of Ebla," will be shown as part of the course.

363 The History and Culture of Ancient Mesopotamia Fall. 4 credits. Open to all students with permission of instructor.

M W F 10:10. R. S. Falkowitz.

Emphasis will be placed on the history, art, and archaeology of Ancient Mesopotamia.

[365 History of the Ancient Near East in Biblical Times Fall. 4 credits. Not offered 1981–82.]

469 Independent Study Fall or spring. Variable credit. Directed readings on the history, culture, and civilization of the ancient Near East. Staff.

Related Course in Another Department

[Greeks and Their Eastern Neighbors (Classics 322) Not offered 1981–82.]

History of the Jewish People

[243 History of Ancient Israel to 450 B.C.E. Spring. 4 credits. Not offered 1981–82.]

244 Jews of the Ancient and Muslim Near East: 450 B.C.E.—1204 C.E. Fall. 4 credits. Open to freshmen.

T R 10:10–11:25. J. Cohen.

A survey of the political, cultural, and social history of the Jews, from the period of Ezra and Nehemiah until the death of Moses Maimonides. The focus will be on the link between the Jewish history of late ancient and early medieval times and the evolution of the classical Jewish world view as the development of the Jewish community is traced from that of a local tribal kingdom to that of a multinational religion. Of special concern will be the interaction of the Jews with innovative cultural trends in the Gentile world around them—first those of Greece and Rome, then

those of Christianity and Islam to which the Jewish community helped give rise. Emphasis will be placed on the reading of historical documents in translation.

[245 The Emergence of the Modern Jew: 476–1948 Spring. 4 credits. Not offered 1981–82.]

[343 The Jewish Community Throughout History Spring. 4 credits. Not offered 1981–82.]

[344 Age of the Patriarchs Fall. 4 credits. Not offered 1981–82.]

[347 Judaism and Christianity in Conflict Fall. 4 credits. Not offered 1981–82.]

[422 Seminar in Jewish History: The Medieval Church and the Jews Not offered 1981–82.]

449 Independent Study Fall or spring. Variable credit. Prerequisite: permission of instructor. J. Cohen and D. I. Owen. Directed readings on the history, culture, and civilization of ancient Israel and the Jewish people.

Islamic

151–152 Islamic Civilization 151, fall; 152, spring. 3 credits each term. 151 is not a prerequisite for 152. NES 151 or 152 may be used to satisfy either the distribution requirement in history or in the humanities or the Freshman Seminar requirement.

M W F 1:25. P. D. Molan and D. S. Powers.

NES 151 treats the seven centuries between the birth of Muhammad (c.570 A.D.) and the Mongol sack of Baghdad in 1258 A.D. NES 152 covers the period between the rise of the Gunpowder Empires in the sixteenth century and the present. The course will treat major political, social, and intellectual developments as revealed in Arabic historical, literary, and religious texts in translation. Topics to be discussed include: Sunni and Shi'i Islam, governance and the emergence of military slavery, the status of minorities, art, and architecture.

244 Jews of the Ancient and Muslim Near East: 450 B.C.E.—1204 C.E. See course description under History of the Jewish People.

251 Studies in the Popular and Courtly Literatures of the Islamic Middle East See course description under Arabic Literature.

252 Islamic Law and Society Spring. 3 credits. T R 10:10. D. S. Powers.

The *Shari'a* 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'a* 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'a* 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 *ihad* (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'a* in the modern world, with special reference to the problems and challenges of legal reform.

459 Independent Study Fall or spring. Variable credit. Prerequisite: permission of instructor. Staff.

Near Eastern and Biblical Archaeology

261 Ancient Seafaring (also Archaeology 275) Fall. 3 credits.

T R 12:20–1:35. D. I. Owen.

A survey of the history and development of archaeology under the sea. The role of nautical

technology and seafaring among the maritime peoples of the ancient Mediterranean world—Canaanites, Minoans, Mycenaeans, Phoenicians, Hebrews, Greeks, and Romans—as well as the riverine cultures of Mesopotamia and Egypt. Evidence for maritime trade, economics, exploration and colonization, and the role of the sea in religion and mythology are discussed.

[262 Mediterranean Archaeology (also Classics 200 and Ancient Mediterranean 200)] Fall. 3 credits. Not offered 1981–82.]

[263 Introduction to Biblical Archaeology in Israel] Spring. 3 credits. Not offered 1981–82.]

362 The History and Archaeology of Ebla
See course description under History of Ancient Near Eastern Civilizations.

364 Introduction to Field Archaeology in Israel
Summer.
D. I. Owen.
See course description in the *Announcement of Summer session 1982*.

[366 Archaeology of the Ancient Near East (also Archaeology 310)] Spring. Not offered 1981–82.]

[367 Archaeology of Ancient Egypt] Fall. 4 credits. Not offered 1981–82.]

[461 Seminar in Syro-Palestinian Archaeology: The Israelite Conquest of Canaan] Fall. 4 credits. Not offered 1981–82.]

Related Course in Another Department

[The Archaeology of Cyprus (Classics 321)] Not offered 1981–82.]

Honors Course

499 Independent Study: Honors Fall or spring. Variable credit.
Directed readings and conferences center on the candidate's honors thesis. The thesis topic must be approved by the department at the end of the second term of the junior year.

Related Courses in Other Departments

Introduction to Classical Archaeology (Art History 220)

Minoan-Mycenaean Art and Archaeology (Classics 221)

New Testament Greek (Classics 308)

[Introduction to Medieval Latin (Classics 214)] Not offered 1981–82.]

Introduction to Classical Archaeology (Classics 220) Not offered 1981–82.]

[Art and Archaeology of Archaic Greece (Classics 326)] Not offered 1981–82.]

[Pagan and Christian at Rome (Classics 332)] Not offered 1981–82.]

[Problems in Minoan-Mycenaean Archaeology (Classics 629)] Not offered 1981–82.]

Philosophy

D. B. Lyons, chairman; J. G. Bennett, R. N. Boyd, G. Fine, C. A. Ginat, H. Hodes, T. H. Irwin, N. Kretzmann, R. W. Miller, S. Shoemaker, R. C. Stalnaker, N. L. Sturgeon, A. W. Wood

The study of philosophy provides students with an opportunity to become familiar with some of the great ideas and great works in the history of thought, while developing analytical skills which 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 of at least three credits each 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 of at least three credits each numbered above 300, at least one of which must be numbered above 400 (with the exception of 490).

A course in mathematical logic (either 231 or 331), while not required, is especially recommended for majors or prospective majors.

Philosophy majors must also complete at least eight credits of course work in related subjects approved by their major advisers.

Occasionally majors may serve as teaching or research aides, working with faculty members familiar with their work.

Honors. A candidate for honors in philosophy must be a philosophy major with a B—or better for all work in the College of Arts and Sciences and an average of B or better for all work in philosophy. In either or both terms of the senior year a candidate for honors enrolls in Philosophy 490 and undertakes research leading to the writing of an honors essay by the end of the final term. Prospective candidates should apply at the Department of Philosophy office, 218 Goldwin Smith Hall.

Fees. In some courses there may be a small fee for photocopying materials to be handed out to students.

Introductory Courses

These courses have no prerequisites; all are open to freshmen.

100 Freshman Seminar in Philosophy Fall or spring. 3 credits. Limited to freshmen who have not taken Philosophy 101. Independent sections, each limited to 20 students. Letter grade only.
Fall: M W F 8:00, J. Bennett; M W F 10:10, staff; M W F 11:15, N. Sturgeon; M W F 1:25, R. Boyd; M W

F 2:30, staff; T R 10:10–11:25, A. Wood; T R 12:20–1:35, staff; T R 2:30–3:45, staff. Spring: M W F 9:05, staff; M W F 10:10, staff; M W F 11:15, staff; M W F 1:25, R. Stalnaker; M W F 2:30, staff; T R 10:10–11:25, staff; T R 12:20–1:35, staff; T R 2:30–3:45, R. Miller.

101 Introduction to Philosophy Fall or spring. 3 credits.

Fall: T R 10:10–11:25; N. Kretzmann. Spring: M W F 11:15; G. Fine.

Classical and contemporary problems in philosophy studied through the writings of some of the major philosophers in the Western tradition (such as Plato, Descartes, Hume, Kant, Mill, Russell). Questions discussed may include: what is knowledge, and how can we know anything? Can we have rational grounds for belief in God? Are human beings anything more than machines? Is anything objectively right or wrong?

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.

210 Ancient Thought Fall. 4 credits.

M W F 9:05. T. 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 relations 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 translation are selected from Homer, the Pre-Socratic philosophers, Greek tragedy, Thucydides, Plato, Aristotle, the Stoics, Epicurus, Lucretius, Marcus Aurelius, the Hebrew Prophets, the Wisdom of Solomon, the Gospels, the Letters of St. Paul, Plotinus, St. Augustine.

[211 Ancient Philosophy] Not offered 1981–82.]

212 Modern Philosophy Spring. 4 credits.

T R 12:20–1:35. A. Wood.

A survey of some central philosophical problems in the rationalists, empiricists, and Kant. Typical problems include: the nature and limits of knowledge; perception; the existence and nature of God; free will and determinism; mind and body. Readings from Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, and Kant.

[213 Existentialism] Not offered 1981–82.]

[214 Philosophical Issues in Christian Thought] Not offered 1981–82.]

231 Formal Logic Spring. 4 credits.

M W F 9:05. C. Ginat.

Analysis and evaluation of deductive reasoning in terms of formalized languages. The logic of sentences, predicates and quantifiers. (This course, rather than 331, is the recommended introductory formal logic course for students unsure of their mathematical aptitude, or without mathematical background.)

241 Ethics Spring. 4 credits.

M W F 1:25. T. Irwin.

Introduction to philosophical study of major ethical questions, including both general theoretical issues (e.g., Are there objective values? Is human nature inevitably selfish?) and also practical moral problems

(e.g., war, abortion, equality of opportunity and reverse discrimination). Readings from classical ethical writers (Plato, Mill, Nietzsche) and from contemporary sources.

242 Social and Political Theory Fall. 4 credits.
T R 2:30–3:45. 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. Topic for 1981–82: Liberty, authority and social conflict—Individualism and its critics from Hobbes to Marx.

[243 Aesthetics] Not offered 1981–82.]

245 Biomedical Ethics Fall. 3 credits.
See course description under Biological Sciences 205.

246 Environmental Ethics Spring. 3 credits.
See course description under Biological Sciences 206.

261 Knowledge and Reality Fall. 4 credits.
T R 10:10–11:25. G. Fine.

An introduction to some of the central philosophical problems and theories about knowledge and reality. Topics may include: skepticism; our knowledge of the external world; sense perception; God; free will and determinism; causation; substance; theories of universals; the foundations of knowledge; certainty. Readings from classical and contemporary sources.

262 Philosophy of Mind Fall. 4 credits.
M W F 10:10. S. Shoemaker.

Discussion of a number of problems about the nature of mind. For example, can thoughts and feelings be physical events in the brain? Might computers or robots be conscious beings? What is it that constitutes a person's identity—the unity of his consciousness? Is there a conflict between free will and determinism?

263 Reason and Religion Fall. 4 credits.
T R 12:20–1:35. 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 11:15. R. Boyd and N. Sturgeon.

An examination of attempts in the biological and social sciences to offer scientific theories of human nature and human potential and to apply such theories to explain important social and psychological phenomena. Topics vary and may include issues in psychology such as behaviorism, Freudianism, and artificial intelligence, or issues in the foundations of historical theory such as methodological individualism and economic determinism as well as relevant issues in the biological sciences. Topic for 1981–82: Darwin, social Darwinism, and sociobiology.

Intermediate Courses.

Some of these courses have prerequisites.

309 Plato Fall. 4 credits.

T R 1:00–2:15. G. Fine.
A survey of Plato's major dialogues, including the *Apology*, *Meno*, *Phaedo*, *Republic*, *Parmenides*, *Theaetetus* and *Sophist*. Plato's views on a variety of topics: his theory of forms; immortality; knowledge; sense and intellect; ethics and political theory.

[310 Aristotle] Not offered 1981–82.]

[311 Modern Rationalism] Not offered 1981–82.]

312 Modern Empiricism Fall. 4 credits.
M W F 1:25. S. Shoemaker.

The philosophies of the classic British empiricists, Locke, Berkeley and Hume. Topic for 1981–82: Hume's *Treatise of Human Nature*.

[313 Medieval Philosophy] Not offered 1981–82.]

[314 Topics in Ancient Philosophy] Not offered 1981–82.]

315 Special Topics in the History of Philosophy Fall. 4 credits.

T R 2:30–3:45. A. Wood.
Topic for 1981–82: Schopenhauer and Nietzsche.

316 Kant Spring. 4 credits.

M W F 2:30. T. Irwin.
Introduction to Kant's main doctrines in metaphysics, theory of knowledge, and ethics. Kant's place in the history of philosophy; how he tries to reconcile and transcend the best insights of rationalism and empiricism. Kant's new philosophical perspective; can we have knowledge of the world as it really is, or can we only know our way of seeing the world? Topics include: the possibility of non-empirical 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 10:10–11:25. A. Wood.
An introduction to Hegel's philosophy through study of his first systematic philosophical treatise, the *Phenomenology of Spirit*. Emphasis is given to Hegel's dialectical method, but the focus of discussion is on topics covered in the *Phenomenology*.

318 Twentieth-Century Philosophy Spring. 4 credits.

M W F 1:25. S. Shoemaker.
A survey of several important twentieth-century philosophers.

319 Philosophy of Marx Spring. 4 credits.
W 7:30–10:30 p.m. 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 post-capitalist 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 11:15. R. Stalnaker.

Sentential logic and first order quantification theory. Covers the same material as 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.

341 Ethical Theory Spring. 4 credits.

T R 12:20–1:35. N. Sturgeon.
A survey of several important ethical theories, and theories about the nature and justification of ethical theories, using both classical and contemporary sources. Topic for 1981–82: Intuitionism, skepticism, and naturalism.

342 Law, Society, and Morality (also Law 666) Spring. 4 credits.

M W F 10:10. D. Lyons.
An introduction to legal and political philosophy emphasizing the nature of law, the problem of coercion, principles of justice, and general welfare.

[361 Metaphysics and Epistemology] Not offered 1981–82.]

[363 Topics in the Philosophy of Religion] Not offered 1981–82.]

381 Philosophy of Science Fall. 4 credits.
W 7:30–10:30 p.m. R. Boyd.

An examination of central epistemological and metaphysical issues raised by scientific theorizing: the nature of evidence, scientific objectivity, the nature of theories, "models" and paradigms, the character of the scientific revolution. 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 1981–82.]

383 Philosophy of Choice and Decision Fall. 4 credits.

M W F 10:10. 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, collective choice.

[387 Philosophy of Mathematics] Not offered 1981–82.]

[388 Social Theory] Not offered 1981–82.]

[389 Philosophy of History] Not offered 1981–82.]

390 Informal Study Fall or spring. Credit to be arranged. To be taken only in exceptional circumstances. Must be arranged by the student with his or her adviser and the faculty member who has agreed to direct the study.
Staff.

Advanced Courses and Seminars

These courses are intended primarily for majors and graduate students.

395 Majors Seminar Spring. 4 credits. S-U grades only. Limited to junior and senior philosophy majors.
T 2:30–4:25. C. Ginet.

An examination of some contemporary discussions of three or four philosophical problems. For example, free will versus determinism, personal identity, the objectivity of moral claims, problems in the philosophy of language.

[412 Medieval Philosophy] Not offered 1981–82.]

413 Plato and Aristotle Spring. 4 credits.
W 3:45–5:40. G. Fine.
Topic to be announced.

[431 Deductive Logic] Not offered 1981–82.]

[433 Philosophy of Logic] Not offered 1981–82.]

436 Intensional Logic Spring. 4 credits.
Prerequisite: Philosophy 231 or equivalent.

M W F 11:15. R. Stalnaker.
Formal semantics for, and philosophical applications of, various modal and intensional logics.

[437 Problems in the Philosophy of Language] Not offered 1981–82.]

[441 Contemporary Ethical Theory] Not offered 1981–82.]

[442 Ethics and the Philosophy of Mind Not offered 1981–82.]

[443 Topics in Aesthetics Not offered 1981–82.]

444 Contemporary Legal Theory (also Law 623) Spring. 4 credits. Limited enrollment; preference given to law students.

R 3:45–5:25. D. Lyons.
Recent work on the nature of law and its relations to morality, with an emphasis on the writings of H.L.A. Hart and Ronald Dworkin.

461 Metaphysics Spring. 4 credits.

M W F 10:10. S. Shoemaker.
Topic for 1981–82: The Self. An examination of philosophical problems about self-consciousness, self-reference, and the nature of mind.

[462 Theory of Knowledge Not offered 1981–82.]

481 Problems in the Philosophy of Science Fall. 4 credits.

W 3:45–5:40. R. Miller.
Topic for 1981–82: Explanation and confirmation in the natural and the social sciences—realist, formalist, and relativist perspectives.

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 W 2:30–3:45. T. Irwin.
Topic for 1981–82: Aristotle's metaphysics and philosophy of mind.

[612 Medieval Philosophy Not offered 1981–82.]

[613 Modern Philosophers Not offered 1981–82.]

[619 History of Philosophy Not offered 1981–82.]

[631 Logic Not offered 1981–82.]

[632 Semantics Not offered 1981–82.]

[633 Philosophy of Language Not offered 1981–82.]

641 Ethics and Value Theory Fall. 4 credits.

R 3:45–5:40. N. Sturgeon.
Topic for 1981–82: Moral Realism and its Critics.

[661 Theory of Knowledge Not offered 1981–82.]

662 Philosophy of Mind Spring. 4 credits.

R 3:45–5:40. C. Ginet.
Topic for 1981–82 to be announced.

664 Metaphysics Fall. 4 credits.

M 3:45–5:40. R. Stalnaker.
Topic for 1981–82: Mental representation.

665 Metaphysics Spring. 4 credits.

T 3:45–5:40. R. Boyd.
Topic for 1981–82: Naturalism in epistemology, ethics, and philosophy of language.

[681 Philosophy of Science Not offered 1981–82.]

[682 Philosophy of Social Science Not offered 1981–82.]

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.

Physics

D. B. Fitchen, chairman; V. Ambegaokar, N. W. Ashcroft, K. Berkelman, H. A. Bethe (emeritus), D. G. Cassel, G. V. Chester, R. M. Cotts, J. W. DeWire, M. E. Fisher, R. Galik, M. Gilchriese, B. Gittelman, K. Gottfried, S. Gregory, K. Greisen, L. N. Hand, D. L. Hartill, P. Hartman, W. Ho, D. F. Holcomb, T. Kinoshita, V. Kistiakowski, J. A. Krumhansl, D. M. Lee, G. P. Lepage, R. M. Littauer, B. D. McDaniell, H. Mahr, N. D. Mermin, J. Orear, M. E. Peskin, R. O. Pohl, J. D. Reppy, R. M. Richardson, R. C. Richardson, E. E. Salpeter, R. H. Siemann, A. J. Sievers, E. Siggia, R. H. Silsbee, A. Silverman, P. C. Stein, R. M. Talman, S. A. Teukolsky, M. Tigner, J. W. Wilkins, K. G. Wilson, T. M. Yan, D. R. Yennie

Research in the Department of Physics centers on two major resources, the Laboratory of Atomic and Solid State Physics (LASSP) and the Laboratory of Nuclear Studies (LNS). LASSP has achieved national eminence both in solid-state and in low-temperature physics. LNS has concentrated on high-energy particle physics. Presently it operates, on campus, an electron-positron colliding-beam storage ring and the world's largest electron synchrotron. Students who are advanced and interested enough have access to the latest and most exciting developments through a full schedule of seminars and colloquia. There are 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, 201 through 205. Physics 101–102, a self-paced audiotutorial course, is designed for students who do not intend to go into physics 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. 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.

For those who wish to pursue some physics beyond the introductory level, several courses may be appropriate: Physics 330, Modern Experimental Optics; Physics 360, Introductory Electronics.

Advanced placement and credit are offered as outlined in the section, 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 112–213–214 or 112–217–218 (and preferably 315) by the end of the sophomore year. A basic preparation for a less intensive physics program may include 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 or 193–194–295–296 are normally recommended, except for students especially interested in continuing the study of pure 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 graduate 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 a concentration.

Core requirements for the major include:

- 1) 112–213–214 (or 112–217–218) or 207–208.
- 2) an intermediate physics course in each of four areas:
 - (a) mechanics—Physics 431 or 318,
 - (b) electricity and magnetism—Physics 432 or 325,
 - (c) modern physics—Physics 315 or 443, and
 - (d) laboratory physics—Physics 310, 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, 112–213–214 (or 112–217–218), 318, 325, 315, or 443, and 410 is appropriate, while for concentrations outside physics part (2) of the core might consist of 315, 431, 432, and 410.

Concentration reflects the student's interest in some area related to physics: the array of courses must have internal coherence. The concentration must include at least 15 credits, with at least 8 credits in courses numbered above 300. Students have chosen to concentrate in physics, biophysics, chemical physics, astrophysics; natural sciences; history and philosophy of science; computer science; business and economics.

The concentration in physics is recommended as preparation for professional or graduate work in physics or a closely related discipline. Twelve credits from physics courses above 300, in addition to those selected for part (2) of the core, are required; 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, Physics 444, Physics 454, Applied and Engineering Physics 401, Astronomy 431–432, or Geological Sciences 485–486. Students with a concentration in physics who wish to emphasize preparation for astronomy or astrophysics should consult the astronomy section of this Announcement. 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.

Foreign language requirement. Students interested in eventual graduate work in physics are advised to meet this requirement with French, German, or Russian.

Honors. A student may be granted honors in physics upon the recommendation of the physics advisers committee of the physics faculty.

Distribution Requirement

The requirement in physical sciences is met by any two sequential courses such as Physics 101–102 or 207–208, or by any two general-education courses from the group 201–205.

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.

101–102 General Physics 101, fall, except by special permission; 102, spring; may also be offered during summer session. 4 credits each term. Prerequisites: three years of high school mathematics, including some trigonometry. Prerequisite for Physics 102: 101 or 112 or 207. Includes more modern physics and less mathematical analysis than Physics 207–208 or 112–213–214, but more mathematics than courses in Physics 201 to 205. Students planning to major in a physical science should elect Physics 207–208 or 112–213–214. A self-paced, mastery-oriented audiotutorial format; students work in a learning center at hours of their own choice. Repeated tests on each unit are given until mastery is demonstrated.

One large orientation meeting on R Sept. 3, 10:10 a.m. or 12:20 p.m. or T Feb. 2, 7:30 p.m.

B. Richardson and staff.

Basic principles treated quantitatively but without calculus. Major topics for 101: Particle structure of matter; kinematics; forces and fields (including electric fields); momentum, angular momentum, energy (including nuclear energy); relativity; sound waves. 102: Electricity and magnetism; optics; thermal physics; quantum physics. Laboratory emphasizes instrumentation, measurement and interpretation of data. Text: *Physics for College Students—with Applications to the Life Sciences* by Tilly and Thumm.

112 Physics I: Mechanics and Heat Fall or spring; may also be offered during summer session. 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisite: coregistration in Mathematics 192 (or 194 or 112), or substantial previous contact with introductory calculus, combined with coregistration in Mathematics 191 (or 193 or 111).

Lecs, M W F: 10:10 or 12:20; 2 recs each week; one 2-hour lab alternate weeks. Evening exams: fall, Oct. 15, Dec. 1; spring, Mar. 4, Apr. 6. Fall, P. Stein; spring, R. Littauer.

Mechanics of particles: kinematics, dynamics, special relativity, conservation laws, central force fields, periodic motion. Mechanics of many-particle systems: center of mass, rotational mechanics of a rigid body, static equilibrium. Introduction to thermodynamics. At the level of *Fundamentals of Physics*, 2nd edition, extended by Halliday and Resnick.

201 Great Ideas of Physics Fall. 3 credits. Intended for nonscientists; does not serve as a prerequisite to further science courses. Assumes no scientific background, but may use some high school mathematics.

Lecs, M W F 2:30; disc, T 12:20 or 2:30.

Topics include the nature of light and the interaction of light and matter, with applications such as lasers and holograms; also the concepts of energy and the arrow of time, with a discussion of solar and nuclear energy conservation.

202 Physics in the World Around Us Spring. 3 credits. Intended for nonscientists; does not serve as a prerequisite to further science courses. Assumes no scientific background, but may use some high school mathematics.

Lecs, M W F 2:30; disc, T 12:20 or 2:30. D. Mermin. Basic principles of physics are used for the understanding of the universe at large as well as the submicroscopic world of elementary particles. Short discussions of the origin of life, relativity, and cosmology are included.

[203 The Physics of Space Exploration Spring. Not offered 1981–82.]

204 Physics of Musical Sound Fall. 3 credits. Intended for nonscientists; does not serve as a prerequisite to further science courses. Assumes no scientific background, but will use some high school algebra.

Lec, M W F 2:30; disc to be arranged.
R. H. Silsbee.

The basic physical characterization of sound in terms of pitch, intensity, and tone quality is developed, as well as the important concepts necessary to understand many features of the production, propagation, and perception of sound. Among the specific topics that are discussed are mechanisms of tone production in musical instruments, speculations as to the basis of consonance and dissonance, the structure of musical scales, architectural acoustics and the principles of electronic synthesis of musical sound.

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 some 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.

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 191 or 111. Prerequisites for Physics 208: Physics 207 (or 112 or 101) and at least coregistration in Mathematics 192 or 112. Physics 207–208 is intended as the first college physics course 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. 15, Nov. 19, spring, Mar. 4, Apr. 8. Fall, R. Cotts; spring, R. Pohl.

Core-plus-branch plan. The first nine weeks of each semester are devoted to core material (lec/discussion/lab format): 207, particle 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 an unstructured, self-paced 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.

213 Physics II: Electricity and Magnetism Fall or spring; may also be offered during summer session. 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisites: Physics 112 and coregistration in the continuation of the mathematics sequence required for 112.

Lecs, T R 9:05 or 11:15; 2 recs each week; one 3-hour lab alternate weeks. Evening exams: fall, Oct. 8, Nov. 3, Nov. 24; spring, Feb. 23, Mar. 18, Apr. 15. Fall, J. Orear.

Electrostatics, behavior of matter in electric fields, magnetic fields, Faraday’s law, electromagnetic oscillations and waves, magnetism. At the level of *Fundamentals of Physics* by Halliday and Resnick. Laboratory covers electrical measurements, dc and ac circuits, resonance phenomena.

214 Physics III: Optics, Waves, and Particles Fall or spring; may also be offered during summer session. 3 or 4 credits. Primarily for students of

engineering and for prospective physics majors. Prerequisites: Physics 213 and coregistration in the continuation of the mathematics sequence required for 112. (Physics 310 may be taken, with permission of the instructor, in place of the Physics 214 lab and credit for 214 is reduced to 3 credits.)

Lecs, T R 9:05 or 11:15; 2 recs each week; one 3-hour lab alternate weeks. Evening exams: fall, Oct. 8, Nov. 3, Nov. 24; spring, Feb. 23, Mar. 18, Apr. 15. Fall, R. Richardson; spring, D. Holcomb.

Wave phenomena; electromagnetic waves; optics; quantum effects, matter waves; uncertainty principle; introduction to wave mechanics.

217 Physics II: Electricity and Magnetism Fall or spring. 4 credits. Intended for students who have done very well in Physics 112 and desire a more analytic treatment than that of Physics 213.

Prospective physics majors are encouraged to select Physics 217. Prerequisites: permission of instructor and approval of the student’s adviser before course enrollment. Prerequisites also include a knowledge of the fundamentals of electricity and magnetism and a good mathematical background, including the use of vector calculus.

Lecs, T R S 11:15; rec, T 3:35; lab, R 1:30–4:30.

Evening exams may be scheduled. Fall: R. Littauer; spring: D. Cassel.

A more rigorous version of Physics 213, at the level of *Electricity and Magnetism* by Purcell (Vol II, 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 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. Spring: J. Orear.

310 Intermediate Experimental Physics Fall or spring. 3 credits. Prerequisite: Physics 208 or 213. May be taken concurrently with 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: P. Hartman; spring: J. Reppy.

Students select from a variety of experiments and may work on experiments of their own design if equipment is available. 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:

T. M. Yan; spring: D. Lee.

Introduction to the physics of atoms, solids, and nuclei, emphasizing the description of phenomena using the results of elementary quantum and statistical physics. At the level of *Introduction to Modern Physics* by Richtmyer, Kennard, and Cooper.

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.)

Lecs, M 11:15–1:15, W F 11:15. R. Cotts.

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 208 or 214 plus coregistration in one of Mathematics 421, 422, or 423, or permission of instructor. Intended for physics majors concentrating in physics. Similar material is covered in Physics 432 at a less demanding analytical level.

Lecs, T R S 11:15, T 3:35. J. Wilkins.
Electrostatics: electric charge and fields, potential, multipoles, conductors, Laplace equation and formal solutions, field energy, dielectric materials, polarization. Magnetostatics: currents, magnetic fields and vector potential, magnetic materials, field energy. Maxwell's equations. At the level of *Lectures on Physics* Vol. II by Feynman and *Foundations of Electromagnetic Theory* by Reitz and Milford.

326 Electromagnetic Waves and Physical Optics Spring. 4 credits. Prerequisite: Physics 325.

Lecs, T R S 9:05, W 1:25. M. Peskin.
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. 3 credits. Prerequisite: one year of physics.

Lec, M 2:30; lab, T W R or F 1:25-4:15.
A practical, lab-based course for students of physical and biological sciences. Students select four or five subject units to match their interests and backgrounds. The units include: physics of lasers, image formation, holography, spectroscopy, light pulses, coherence and correlation, diffraction and interference, light sources and detectors. Each unit involves one or more experiments from a set of varying difficulty and sophistication, and readings, supplementary notes, and problems. An introduction to modern optical techniques and equipment used in current research in such fields as 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. J. Reppy.
Statistical physics, developing both thermodynamics and statistical mechanics simultaneously. Concepts of temperature, laws of thermodynamics, entropy, thermodynamics 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 Introductory Electronics (also Engineering A&EP 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 somewhat slower-paced treatment might consider taking Electrical Engineering 210 before Physics 360.

Lec, M 2:30-4:25; labs, T R or W F 1:25-4:25. Fall, D. Holcomb.
An experimental survey of some devices and circuits in two general areas: analog and digital electronics. In analog circuits, the major emphasis is on operational amplifiers and their applications. Discrete devices (diodes, bipolar transistors, and field-effect transistors) are covered briefly. In digital circuits, some time is spent on combinatorial logic devices. This experience is then applied to problems in programming and interfacing a simple microcomputer.

400 Informal Advanced Laboratory Fall or spring; may also be offered during summer session. Variable credit. Prerequisite: two years of physics and permission of instructor.

Lab, see Physics 410.
Experiments of widely varying difficulty in one or more areas, as listed under Physics 410, may be done to fill the student's special requirements.

410 Advanced Experimental Physics Fall or spring. 4 credits. Limited to seniors except by special permission. Prerequisites: Physics 214 (or 310 or 360) plus 318 and 325, or permission of instructor.

Lec, M 2:30-4:25; labs, T W 1:25-4:25. Fall, R. Siemann and staff; spring, S. Gregory and staff.
Selected topics in experimental concepts and techniques. About seventy different experiments are available in mechanics, acoustics, optics, spectroscopy, electrical circuits, electron and ion physics, heat, X rays and crystal structure, solid-state physics, cosmic rays, and 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: 431: Physics 207-208 or equivalent and Mathematics 294 or equivalent; 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 11:15 and F 1:25.
431: Mechanics. Includes Newtonian mechanics, Lagrange's and Hamilton's equations, central forces, rigid-body motion, and small oscillations. At the level of *Classical Dynamics* by Marion. 432: Electricity and magnetism. Includes electrostatics, magnetostatics, boundary value problems, dielectric and magnetic media, circuit theory. Maxwell's equations and electromagnetic waves. At the level of *Electricity and Magnetism*, third ed., by Bleaney and Bleaney.

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 3:35. A. Sievers.
Introduction to concepts and techniques of quantum mechanics, at the level of *Introduction to Quantum Mechanics*, by Dicke and Wittke.

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.
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.

[464 Physics of Macromolecules] Spring. Not offered 1981-82.]

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.

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. Not offered 1981-82.]

510 Advanced Experimental Physics Fall or spring. 3 credits.

Labs, T W 1:25-4:25. Fall, R. Siemann and staff; spring, S. Gregory and staff.
About seventy different experiments are available in mechanics, acoustics, optics, spectroscopy, electrical circuits, electronics and ionics, heat, x rays, crystal structure, 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.

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.

Lecs, T R S 10:10. J. Krumhansl.
Lagrangian and Hamiltonian formulation of classical mechanics and modern applications in nonlinear dynamics. The foundations will be taught at the level of the Landau and Lifshitz's tract on mechanics, together with selected portions from V.I. Arnold, *Mathematical Methods of Classical Mechanics*. Approximately the latter third of the course will be directed at questions of stability and stochasticity in nonlinear systems and nonlinear waves such as solitons.

[553-554 General Relativity (also Astronomy 509-510)] 553, fall; 554, spring. 4 credits. Not offered 1981-82.]

561 Classical Electrodynamics Fall. 3 credits.

Lecs, M W F 9:05. D. Yennie.
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. M. E. Fisher.
Thermodynamic assemblies; Legendre transformation. Ergodic and information theory ideas. Ensembles and partition functions; equivalences and fluctuations; indistinguishability. Thermodynamic properties of ideal gases and crystals; Third Law; chemical equilibria. Imperfect gases; correlation functions and their applications. Ideal quantum gases; Bose-Einstein condensation. Ideal paramagnets. Ising-models and lattice gases. At the level of *Kubo's Statistical Mechanics*.

572 Quantum Mechanics I Fall or spring. 4 credits.

Lecs, M W F 11:15. Fall, D. Mermin; spring, T. Yan.
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 Schrodinger 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. V. Ambegaokar. Discussion of various applications of quantum mechanics, such as collision theory, theory of spectra of atoms and molecules, theory of solids, emission of radiation, relativistic quantum mechanics. At the level of *Intermediate Quantum Mechanics* by Bethe and Jackiw.

[612 Experimental Atomic and Solid-State Physics] Fall. 3 credits. Not offered 1981–82.]

614 Experimental High-Energy Physics Spring. 3 credits. Lec, M W F 1:25. R. Siemann. Design principles of high-energy apparatus including beam transport and detection systems, with examples of their applications. Practice in use of relativistic kinematics. Statistical analysis in design and interpretation of experiments.

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 S 11:15. N. Ashcroft. 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, T R 2:30–4. J. Wilkins. Concepts developed in Physics 635 are extended and applied in a survey of the following: band theory and Fermi surface in metals, 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. K. Gottfried. Introduction to the physics of nucleons and mesons. Strong, electromagnetic, and weak interactions. Relevance of symmetry laws to particle physics. Introduction to the quark model. Unification of weak and electromagnetic interactions. At the level of *Introduction to High Energy Physics* by Perkins.

646 High-Energy Particle Physics Spring. 3 credits. Lecs, T R 11:15–12:45; T 2:30. B. Gittelman. Topics of current interest, including hadron electroproduction, electron positron annihilation, and high-energy neutrino reaction, are surveyed. Lectures and reading material are at the level of *High Energy Hadron Physics* by Perl. Students share in leading the discussions.

Only S-U grades will be given in courses numbered 650 or above.

651 Advanced Quantum Mechanics Fall. 3 credits. Lecs, T R 11:15–12:45; T 2:30. M. Peskin. Relativistic quantum mechanics with emphasis on perturbation techniques. Extensive applications to quantum electrodynamics. Introduction to renormalization theory. At the level of *Relativistic Quantum Mechanics* by Bjorken and Drell.

652 Quantum Field Theory Spring. 3 credits. Lecs, M W F 10:10. Canonical field theory, model field theories. Green's

functions, renormalization. Introduction to analytic properties of scattering amplitudes and dispersion relations. Applications to strong interactions. At the level of *Relativistic Quantum Fields* by Bjorken and Drell.

653 Statistical Physics Fall. 3 credits. Normally taken by students in their second or later years. Prerequisites: competence in the basic principles of quantum mechanics, statistical mechanics, and thermodynamics. Lecs, M W F 9:05. M. Fisher. Survey of topics in modern statistical physics including the theory of simple classical and quantum fluids; the theory of ordered systems such as superfluids and superconductors; kinetic theory and the Boltzmann equation; phenomenological Fermi liquid theory and hydrodynamics; theories of inhomogeneous systems. 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 gives 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. Equilibrium and transport properties of microscopic systems of many particles studied at zero and finite temperatures. Thermodynamic Green's function techniques introduced and applied to such topics as normal and superconducting Fermi systems, superfluidity, magnetism, insulating crystals.

661 High-Energy Phenomena Fall. 3 credits. Lecs, M R F 3:35. P. Lepage. Topics vary at the discretion of the instructor.

[665 Topics in Theoretical Astrophysics (also Astronomy 555)] Not offered 1981–82.]

667 Theory of Stellar Structure and Evolution (also Astronomy 560) Fall. 4 credits. Usually offered during the fall term of odd calendar years. Lec, M W F 2:30. E. Salpeter. Summary of observational facts on stars; dimensional analysis; nuclear reactions and energy, transport in stellar interiors; models for static and evolving stars. At the level of *Principles of Stellar Energy and Nucleosynthesis* by Clayton.

681–689 Special Topics Offerings are announced each term. Typical topics are: group theory, analyticity in particle physics, weak interactions, superfluids, stellar evolution, plasma physics, cosmic rays, general relativity, low-temperature physics, x-ray spectroscopy or diffraction, magnetic resonance, phase transitions and the renormalization group.

690 Independent Study in Physics Fall or spring. Variable credit. Special graduate study in some branch of physics, either theoretical or experimental, under the direction of any professional member of the staff.

Psychology

R. Darlington, director of undergraduate studies, 232 Uris Hall, 256–6353. D. Bem, S. Bem, A. W. Boykin, U. Bronfenbrenner, W. Collins, J. P. Cunningham, J. Cutting, H. M. Feinstein, B. L. Finlay, E. J. Gibson, T. Gilovich, B. P. Halpern, R. E. Johnston, F. Keil, C. Krumhansl, W. W. Lambert, H. Levin, D. Levitsky, J. B. Maas, R. D. Mack, L. Meltzer, U. Neisser, D. T. Regan, E. Adkins Regan, T. A. Ryan, K. E. Weick

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.

Faculty interests and courses frequently bridge fields. For example, the course in human ethology combines the interests and methods of social psychology and animal ethology. Courses on thought and intelligence consider the concepts underlying the measurement of intelligence and their relationship to problem solving. A course on the nature and influence of psychotherapy provides exposure to various psychotherapeutic approaches.

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 advance 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 or field experience or both are recommended); and
- 2) demonstration of proficiency in statistics before the beginning of the senior year. (See section below on 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, 313, 316, 345, 407, 416, 436, 445, or 464.
- 2) **Biopsychology:** Psychology 123, 303, 322, 324, 326, 361, 396, 422, 425, 491. *Note:* Courses in the biopsychology area other than 123 and 303 all have 123 or introductory biology or both among their prerequisites.
- 3) **Social, personality, and abnormal psychology:** Psychology 128, 206, 275, 277, 280, 281, 284, 289, 325, 327, 328, 347, 381, 383, 384, 385, 402, 426, 467, 468, 469, 480, 481, 482, 483, 484, 486, 488 or 489.

The major adviser determines to which group, if any, the following courses may be applied.

- 4) **Other courses:** Psychology 101, 201, 350, 386, 410, 437, 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 452–453, ILR 210–311, and Sociology 325. An up-to-date list is posted outside of 232 Uris Hall. Requests that a particular course be added to this list may be made to Professor Darlington.
- 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 Darlington 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. Most students selecting this option have not found it too difficult. 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 Darlington. A handout describing the exam is available from his secretary.

The concentration in biopsychology. Psychology majors interested in psychology as a biological science can elect to specialize in biopsychology. Students in this concentration must meet all of the general requirements for the major in psychology and must also demonstrate a solid background in introductory biology; the physical sciences, including at least introductory chemistry; and mathematics. Students will design with their advisers an integrated program in biopsychology built around courses on physiological, chemical, anatomical, and ecological determinants of human and nonhuman behavior offered by the Department of Psychology. Additional courses in physiology, anatomy, organic chemistry, biochemistry, neurochemistry, neurobiology, and behavioral biology may be designated as part of the psychology major after consultation between the student and his or her biopsychology adviser.

Concentration in Personality and Social Psychology. This concentration is offered in cooperation with the Department of Sociology. Psychology majors who wish to specialize in social psychology are expected to meet the general requirements set by their department, including statistics. To ensure a solid interdisciplinary grounding, students in the concentration will be permitted to include in the major courses in sociology and related fields. Advisers will assist students in the selection of a coherent set of courses from social organization, cultural anthropology, experimental psychology, social methodology, and several aspects of personality and social psychology. Seniors in the concentration may elect advanced and graduate seminars, with the permission of the instructor.

Honors. The honors program is intended to give students an opportunity to examine selected problems in depth and to carry out independent research under the direction of a faculty member. During the spring term of the junior year, an honors student will enroll in Psychology 494 and will develop

a proposal and begin work on a research project. The student will arrange a meeting with an honors adviser and a faculty sponsor. At the end of the spring term, a report of the semester's work will be submitted for faculty review.

By the fall term of the senior year honors students will have begun work in their final research projects. They will also enroll in a senior honors seminar, Psychology 498, in which research projects will be discussed. Thesis research will continue in the spring with enrollment in Psychology 499, Senior Honors Dissertation. Final honors standing is based on a written thesis and an oral defense of the thesis as well as on general academic performance.

Prospective applicants are advised to file applications early in the fall term of their junior year. Decisions on these applications will be made by the faculty at the end of the fall semester. It is possible for a student who has satisfactorily completed independent study or research to be admitted to the program at the end of the junior year. For consideration by the honors committee of the Department of Psychology, applicants must have a minimum cumulative grade average of at least B+ in all courses in psychology.

Distribution Requirement

The distribution requirement in the social sciences is satisfied by any two courses in psychology with the exception of Psychology 123, 322, 324, 326, 350, 361, 396, 422, 425, 451, 471, 472, 473, 475, 476, 477, 478, 479, 491, and 693.

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. Prerequisites: none but concurrent enrollment in Psychology 101 required. Limited to 400 students.

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 fall registration.

123 Introduction to Psychology: Biopsychology Fall. 3 credits. May not be taken for credit by students who are registered in or have completed one or more courses offered by the Section of Neurobiology and Behavior of the Division of Biological Sciences, or two or more biopsychology courses.

M W F 10:10. E. Adkins Regan and staff.

A survey of behavior emphasizing evolutionary and physiological approaches, designed to introduce students to the interface between biology and psychology. Both human and nonhuman behavior is included, together with theoretical issues pertaining to the application of biological principles to human behavior.

[128 Understanding Personality and Social Behavior Spring. 4 credits. Limited to 450 students. M W F 10:10, sem to be arranged. Staff. Not offered 1981–82.]

190 Thought and Intelligence Spring. 4 credits. Open to juniors and seniors in any field, or to freshmen and sophomores who have had a course in psychology.

M W F 9:05. U. Neisser.

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, 128, or 190). High school credit in psychology may meet this prerequisite with permission of instructor. Staff. Not offered 1981–82.]

205 Perception Fall. 3 credits. Open to first-year students. Limited to 65 student.

T R 10:10–11:30. 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, 128, or 190, or permission of instructor. Not recommended for upperclass students in ILR.

T 12:20, R 12:20–2. S. Davis.

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; Psychology 201 is recommended but not required.

M W F 11:15. T. Gilovich.

Models and research in human motivation are examined and integrated. Traditional approaches are used as departure points for the study of more current themes, such as intrinsic motivation and achievement motivation. Attention is given to how pertinent various themes are to real-life behavioral settings.

209 Developmental Psychology Spring. 4 credits. Prerequisite: an introductory psychology course.

T R 12:20–1:45; sec to be arranged. F. Keil.

A comprehensive introduction to current thinking and research in developmental psychology. Topics include perceptual and cognitive development in infancy and childhood, attachment, language development, Piagetian theory and research, moral development, cross-cultural perspectives, and socialization.

214 Introduction to Cognitive Psychology Fall. 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, and to discuss techniques for investigating problems in these areas.

215 Language and Communication Spring. 3 or 4 credits. The 4-credit option involves a term paper or project. Open to first-year students. Limited to 40. M W F 2:30. J. Cutting.

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 the term paper. Prerequisite: an introductory psychology course.

T R 10:10–11:35; 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 evolutionary 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 attendance at the optional section meeting, and the term paper. Prerequisite: an introductory psychology course.

T R 10:10–11:25. D. Bem.
An introduction to research and theory in social psychology. Topics include human processing of social information; social influence, persuasion, and attitude change; social interaction and group phenomena. The application of social psychological knowledge to current social problems will also be discussed.

284 Social-Psychological Theories and Applications (also Sociology 284) Fall. 3 credits.

T R 9:05; S class is held at the discretion of the instructor. L. Meltzer.
Emphasis is given to those aspects of personality and social psychology which have led to effective practical applications or which provide reasonable insights into the genesis or amelioration of social and personal problems.

[289 Conformity and Deviance (also Sociology 289)] Fall. 4 credits. Prerequisite: one course in psychology or sociology.

T R 3:30. Staff.
What are the ways in which conformity pressures, in all their variations, can lead to deviance? To attempt an answer we will examine some of the conformity bases for run-of-the-mill, normal behavior, and then use the concepts developed to illuminate such behavior as mob violence, suicide, juvenile crime, and craziness.]

[303 Learning] Spring. 3 credits. Prerequisite: Psychology 201 or a 300-level laboratory course in psychology. T R 9:05. Staff. Not offered 1981–82.]

305 Visual Perception Spring. 3 or 4 credits, depending on whether the student elects to do an independent laboratory project. Prerequisite: 205 or permission of instructor.

T R 10:10. C. Krumhansl.
A detailed examination of theories and processes in visual perception. Topics will include the perception of color, space, and motion; perceptual constancies; adaptation; pattern perception; and aspects of perceptual learning and development.

307 Chemosensory Perception Fall. 3 or 4 credits; the optional (or fourth) credit is for an independent laboratory project. Students will read, analyze, and discuss difficult original literature in the areas covered.

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, possible consequences of chemosensory dysfunctions, and use of chemosensory systems as neural model.

[308 Perceptual Learning] Fall. 3 credits. Prerequisite: Psychology 205 or 209 or 305 or permission of instructor. Not offered 1981–82.]

309 Development of Perception and Attention Spring. 3 credits. Prerequisite: Psychology 205, 209, 214, 305, or permission of instructor.

M W F 10:10. Staff.
An ecological view of perceptual development: development of perception of objects, events, the spatial layout, pictures, and symbols. The level of the course is that of E. J. Gibson, *Perceptual Learning and Development*.

313 Perceptual and Cognitive Processes Spring. 3 credits. Prerequisite: Psychology 205 or 214, or permission of instructor.

T R 10:10–11:40. 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 2:30–4:25. H. Levin.
We are aware that one talks differently to children than to adults, to foreigners than to native speakers, to people we like than 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, and by formality, friendship, affection, and purposes of the communication: deception, persuasion, propaganda, et cetera. What are the rules of social language? How do we acquire the abilities to vary language appropriately and to understand the meanings of such variations? We will attend not only to what is said but to the style of the language: for example, to paralanguage (e.g., intonation, hesitations) and to the structure (grammar and semantics) of speech.

[316 Auditory Perception] Spring. 3 or 4 credits (the 4-credit option involves a laboratory project or paper). Prerequisites: Psychology 205, 209, 214, or 215 (other psychology, linguistics, or biology courses could serve as prerequisite with permission of the instructor).

Lecs. T R 2:30–4:25; lab 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.) Prerequisites: one year of introductory biology plus a course in psychology or Biological Sciences 321. Limited to juniors and seniors; open to sophomores only by permission. S-U grades optional.

T R 10:10–11:30. E. Adkins, Regan and 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) Spring. 3 credits. Limited to 25 juniors and seniors. Prerequisites: Psychology 201 or Biological Sciences 103–104 or Psychology 123 or Biological Sciences 321, and permission of instructor. S-U grades optional.

T R 1:25–4:25. Staff.
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). Enrollment in Psychology 327 is limited. 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.

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 Biopsychology of Animal Behavior Fall. 4 credits. Prerequisite: Psychology 123 or an introductory biology course. Offered alternate years.

T R 2:30–4:25. R. Johnston.
A broad comparative approach to the behavior in animals, with special emphasis on mammals and the evolution of human behavior. Topic areas will include courtship and mating systems, aggression and territoriality, parental behavior and imprinting, and the evolution of communication and language.

327 Fieldwork in Psychopathology and the Helping Relationship Fall. 2 credits. Prerequisites: Psychology 325 or concurrent registration in 325 and permission of the 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, \$20.

Hours to be arranged. R. Mack.
An introductory fieldwork course for students currently enrolled in, or who have taken, Psychology 325. In addition to fieldwork, weekly supervisory-seminar meetings are held to discuss fieldwork issues and assigned readings.

328 Continuing Fieldwork in Psychopathology and the Helping Relationship Fall or spring. 2 credits each term. 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, \$20.

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 Afro-American Perspectives in Experimental Psychology (also Africana Studies 345)] Spring. 3 or 4 credits. Prerequisite: introductory course in psychology or AS&RC 171. Offered alternate years. Not offered 1981-82.

T R 2:30-4:25, plus one hour to be arranged if taken for 4 credits. A. W. Boykin.
Designed to examine crucial conceptual, empirical, and philosophical issues in experimental psychology that are directly relevant to Afro-Americans. Traditional approaches are probed and evaluated. Alternative thrusts from a black perspective are entertained and critiqued. Finally, the research process is evaluated as a potential tool for analysis and action in black communities.]

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, et cetera) 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 123, or permission of instructor.

M W F 11:15. D. Levitsky.
The course is intended to survey the scientific literature on the role of the brain and body biochemical changes as determinants of human behavior. The topics covered include action and effects of psychopharmacologic agents, biochemical determinants of mental retardation, biochemical theories of psychosis, effects of nutrition on behavior. A fundamental knowledge of human biology and chemistry is essential.

374 Psychology of Visual Communications Spring. 4 credits. Prerequisites: Psychology 101 and permission of instructor. Limited to 12 students.

T 10:10-12:05; lab to be arranged. J. Maas.
An exploration of theories of perception, attitude, and behavior change as they related 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.

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.

T R 1-2:15. 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.

T R 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) Fall. 4 credits. Prerequisites: a course in psychology and one in either sociology or social or cultural anthropology; or permission of instructor.

M W F 12:20. W. W. Lambert.
A critical survey of approaches, methods, discoveries, and applications in emerging attempts to study human nature, experience, and behavior cross-culturally. Focus on studies of cognition, values, socialization, sociolinguistics, personality, attitudes, stereotyping, ideology, sociocultural development, and mental illness. Problems of how one can learn another culture will also be dealt with.

[385 Theories of Personality (also Sociology 385)] Spring. 4 credits. Prerequisite: Psychology 101, 128, 214, or 275, or permission of instructor. Not offered 1981-82; next offered 1982-83.

M W F 12:20. 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.]

[386 Human Ethology Spring. 4 credits. Prerequisites: a course in social psychology or animal social behavior or permission of instructor. Offered alternate years. Not offered 1981-82.

T R 2:30-4. R. Johnston.
Biological and other approaches to human social behavior will be examined using naturalistic observation techniques. One emphasis will be on parallels between nonhuman vertebrates and humans. Topics include nonverbal communication, use of space, bonding, and interaction rituals.]

[396 Introduction to Sensory Systems (also Biological Sciences 396)] Spring. 3 credits. Prerequisites: an introductory course in biology or biopsychology, plus a second course in neurobiology and 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. No auditors. The course will be taught using the Socratic method, in which the instructor asks questions of the students. Not offered 1981-82; next offered spring 1983 and each spring term thereafter.

T R 9:05; one-hour discussion to be arranged. B. Halpern.
Both those characteristics of sensory systems which are common across living organisms and those sensory properties which represent adaptations of animals to particular habitats or environments will be studied. The principles and limitations of major methods used to examine sensory systems will be considered. Behavioral, including psychophysical, biophysical, neurophysiological, and anatomical, methods will usually be included.]

[402 Current Research on Psychopathology Spring. 4 credits. Prerequisite: Psychology 325. Not offered 1981-82.

T R 12:05-2:15; sec to be arranged. Staff.
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.]

407 Selected Issues in Human Motivation Fall. 4 credits. Limited to 20 students. Prerequisites: 207 or 10 credits in psychology, and permission of instructor.

T 2-4:25. A. W. Boykin.

An in-depth probe of selected contemporary topics in the field of human motivation, such as motivation and academic achievement, intrinsic motivation, motivation in cognitive development. The course will combine instructor lectures and student presentations.

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.

T R 2:30-4. U. Neisser.
Memory and other cognitive activities are considered in their natural and social context. Laboratory studies of memory are reviewed to the extent that they help us to understand ordinary mnemonic activities. Specific topics include memory for remote events and for one's childhood; for controversial and unacceptable material; for stories and conversations; for events; individual, developmental, and cultural differences in memory; effects of schooling and of specific skills.

[416 Psychology of Language Fall. 4 credits. Prerequisite: Psychology 215 or permission of instructor. Not offered 1981-82. Next offered 1982-83.

M W F 9:05. 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.]

422 Developmental Biopsychology Spring. 4 credits. Prerequisites: a course in introductory biology and a course in biopsychology or neurobiology (such as Psychology 123 or Biological Sciences 321).

M W F 9:05. B. Finlay.
Various aspects of the relation of the development of the nervous system to the unfolding of behavior are discussed. Topics include how growing neurons seek, recognize, and communicate with their targets; normal neuroembryology and 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. Prerequisites: a course in introductory biology and a course in biopsychology or neurobiology (such as Psychology 123 or Biological Sciences 321.)

M W F 9:05. B. Finlay.
The relation between structure and function in the central nervous system is studied. 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 the memory and language.

426 Seminar and Practicum in Psychopathology Spring. 4 credits. Limited to 16 juniors or senior majors in psychology or the equivalent (such as HDFS). Prerequisites: Psychology 325; permission of instructor required in all cases.

T R 2:30-4:25; fieldwork to be arranged. R. Mack.

A seminar and fieldwork course for advanced students who have mastered the fundamental concepts of personality and psychopathology. An opportunity to explore in depth the various forms of psychopathology, etiology, and treatment, to discuss these in seminar, and to work with mental health professionals and those who seek their help.

[436 Language Development (also HDFS 436)]

Spring. 3 or 4 credits. Prerequisites: at least one course in cognitive psychology, cognitive development, or linguistics. Offered in alternate years. Not offered 1981–82.

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.]

[437 Human Behavior Genetics]

Fall. 4 credits. Limited to 25 students. Prerequisites: one year of college biology and two courses in psychology. Recommended: course in statistics. Offered alternate years. Not offered 1981–82.

T R 12:50–2:15. Staff.

Research examining genetic influences on personality, cognitive abilities, and mental disorders is considered. Some attention is also paid to biochemical and physiological factors that may be involved in the gene-behavior pathway. The interaction of genetic and environmental influences in human behavior is a continuing theme.]

[440 Sleep and Dreaming]

Spring. 4 credits. Limited to 15 students. Prerequisites: advanced undergraduate or graduate standing and permission of instructor. J. Maas. Not offered 1981–82.]

[443 The Politics of IQ] 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 1981–82.

T R 2:30–4. H. Levin.

The research on the ethnic, racial, and sexual bases of intelligence will be taken as the primary example with which to discuss political and social influences on the choice of research topics, the methods of investigation, and the interpretation of results. Some insights about these issues are available from historical changes in the research and by the comparison of research in various countries, particularly the United States and Great Britain. The writings of Jensen, Herrnstein, Schokley, Burt, Eysenck, Kamin, and their critics will be studied. The genetics of intelligence will not be covered.]

[445 Research Contours of Black Psychology]

Spring. 4 credits. Prerequisites: Psychology 345, or twenty credits of behavioral sciences, or graduate standing, and permission of instructor. Offered alternate years.

T R 2:30–4:25. A. W. Boykin.

An in-depth probe of a selected topic in psychology that pertains directly to black Americans with heavy emphasis on the research process. The course will revolve around five major concerns: (1) critically appraising the relevant research and theorizing already in existence, (2) advancing alternative conceptual models whenever necessary, (3) formulating rigorous and heuristic research paradigms, (4) discussing implications and applications for community-level programs and institutions, and (5) developing a practical yet analytical understanding of research design, and methodology, and the dynamics of problem selection and data inference.]

451 Quasi-Experimentation Spring; weeks 1–7 only. 1 credit. Prerequisite: Psychology 350 or equivalent. Course is pending EPC approval. Offered odd-numbered years. First offered spring 1983.

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 1981–82.

T R 10:10–11:40. J. Cunningham.

Mathematical approaches to psychological theory are discussed. Possible topics include choice and decision, signal detectability, measurement theory, scaling, stochastic models, and computer simulation.]

467 Seminar: The Examined Self—A

Psychohistorical View Spring. 4 credits.

Prerequisites: 9 credits of psychology including Psychology 325 or equivalent, and permission of instructor before course enrollment.

T 12:20–2:15. H. Feinstein.

Based primarily on American autobiographies dating from the seventeenth century to the twentieth century, this seminar will explore the shifting interface between self and historical context. Students should be prepared to write and talk about their own lives as well as the historical figures selected for study.

[468 American Madness] Spring. 4 credits. Limited to 15 students. Prerequisites: Psychology 325 and permission of instructor. Not offered 1981–82.

T 12:20–2:15. H. Feinstein.

The seminar will be devoted to an analysis of insanity as a psychological and historical phenomenon. Selected writings by the mentally ill and their definers will be studied.]

469 Psychotherapy: Its Nature and Influence

Spring. 4 credits. Limited to senior psychology majors. Prerequisites: Psychology 325 or equivalent and permission of instructor before course enrollment.

W 7:30–10:30 p.m. R. Mack.

A seminar on the nature of psychotherapy. Issues related to therapeutic goals, differing views of the nature of man, ethical concerns, and research problems also are considered. Presentations by therapists of differing orientations and experiential and role-play exercises may be an integral part of the seminar experience.

470 Undergraduate Research in Psychology

Fall or spring. 1–4 credits. S-U grades optional. Written permission from the staff member who will supervise the work and assign the grade must be included with the course enrollment material. Students should enroll in the section listed for that staff member. A section list is available from the Department of Psychology.

Hours to be arranged. Staff.

Practice in planning, conducting, and reporting independent laboratory, field, or library research, or a combination of these types of research.

471 Statistical Methods in Psychology I

Fall. 4 credits. Prerequisite: Psychology 201 or equivalent, or permission of instructor.

M W F 11:15. J. Cunningham.

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 only. 2 credits. Prerequisites: Psychology 471 or 350 or permission of instructor.

M W F 10:10. J. Cunningham.

Analysis of variance, experimental design, and related topics. The level of the course is that of G. Keppel, *Design and Analysis: A Researcher's Handbook*.

473 Statistical Methods in Psychology III Spring; weeks 8–14 only. 2 credits. Prerequisites: Psychology 472 or permission of instructor.

M W F 10:10. R. Darlington.

Multiple regression, at the level of *Multiple Regression in Behavioral Research* by F. Kerlinger and E. Pedhazur.

475 Analysis of Nonexperimental Data Fall; weeks 1–7 only. 2 credits. Prerequisite: Psychology 473 or permission of instructor. Offered odd-numbered years.

T R 10:10–12:05. R. Darlington.

Factor analysis and other multivariate correlational methods.

476 Representation of Structure in Data Spring. 3 credits. Prerequisite: one year of college mathematics (finite mathematics or calculus or both) and a course in the social sciences.

T R 10:10–11:40. J. Cunningham.

Representations of preferences, dominance data, psychological distances, and similarities will be discussed. Topics include unidimensional and multidimensional scaling, unfolding, individual differences scaling, hierarchical clustering, and graph-theoretic analysis.

477 The General Linear Model Fall, weeks 8–14 only. 2 credits. Prerequisite: 473 or equivalent. Course is pending EPC approval. Offered odd-numbered years.

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 only. 3 credits. Prerequisite: Psychology 473 or permission of instructor. Course is pending EPC approval. Offered even-numbered years. First offered fall 1982.

T R 10:10–12:05. R. Darlington.

Statistical methods relevant to the use, construction, and evaluation of psychological tests.]

[479 Multi-Sample Secondary Analysis] Fall, weeks 11–14 only. 1 credit. Prerequisite: Psychology 350 or equivalent. Course is pending EPC approval. Offered even-numbered years. First offered fall, 1982.

T R 10:10–12:05. R. Darlington.

Statistical methods for analyzing and integrating the results of many independent studies on related topics.]

480 Seminar: Attitude Theory (also Sociology

480) Fall. 4 credits. Prerequisites: some familiarity with the topic of attitudes from prior courses, or permission of instructor.

R 2–4:25. L. Meltzer.

The seminar will cover three approaches: (1) The reasoned action theory of Fishbein and Ajzen. (2) The balance theory of Fritz Heider, and its many derivatives. (3) The functional theories in psychology (Daniel Katz), psychoanalysis (Freud and others), and cultural anthropology (Marvin Harris). The historical roots and current status of each approach will be analyzed. Students will read original source material rather than textbooks.

481 Advanced Social Psychology (also Sociology

481) Fall. 4 credits. Limited to 30 students. Prerequisite: a course in social psychology or permission of instructor.

T R 10:10–11:25. D. Regan.

Selected topics in social psychology are examined in depth, with heavy emphasis on experimental research. Readings are usually original research reports. Topics discussed may include: social comparison theory, social and cognitive dissonance, attribution processes, interpersonal attraction, and research methods in social psychology.

482 Death and Dying Spring. 4 credits. Limited to 40 juniors and seniors. Prerequisites: 6 credits in sociology or psychology.

Sec 1, T 2:30–4:25; sec 2, 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, and/or anthropology; some background in statistics is assumed. Not offered 1981–82. Next offered 1982–83.

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.]

[484 Individual Differences and Psychological Assessment (also Sociology 484)] Spring. 4 credits. Limited to upperclass students. Prerequisites: an introductory course in psychology and sociology and a course in statistics. Not offered 1981–82.

T R 10:10–12:05. D. Bem, R. Darlington.
An analysis of current methods and models for assessing individual and group differences. Particular emphasis is on the measurement of personality. Quantitative models for predicting behavior from assessment instruments are examined, and current controversial issues in assessment are discussed.]

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.

M W F 12:20. 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 laboratory, industry, and other cultures will be analyzed.

488 Research Practicum in Socialization (also Sociology 488) Spring. 4 credits. Prerequisites: two courses in social psychology or human development and one course in statistics, or permission of instructor.

R 2:30–4:25. U. Bronfenbrenner.
Supervised participation in field and experimental studies bearing on the impact of family support systems on socialization practices and outcomes. The work concentrates on the American phase of a project being conducted cooperatively in five industrialized societies.

[489 Seminar: Selected Topics in Social Psychology and Personality (also Sociology 489)] Fall. 4 credits. Limited to seniors. Prerequisites: one course in psychology and one course in sociology or permission of instructor. Not offered 1981–82.

T 2:30–4:25. Staff.
The specific topics of discussion vary, but the general emphasis is on a critical examination of the study of individuals in social contexts.]

490 History and Systems of Psychology Fall. 4 credits. Intended for sophomores, graduate students, majors, and nonmajors. Prerequisites: at least three courses in behavioral science, or permission of the instructor.

M W F 12:20. M. Henle.
The course aims to acquaint students with the recent history of psychology and to help them identify important systematic trends and underlying assumptions in contemporary writings. After a discussion of relevant nineteenth-century developments, a number of the major historical systems of psychology will be surveyed: the introspectionist, functionalist, behaviorist, and

Gestalt psychologists. Emphasis will be on the analysis of the ideas that have shaped modern psychology; contemporary issues will be introduced as time permits.

491 Principles of Neurobiology, Laboratory (also Biological Sciences 491) Fall. 4 credits. Limited to 24 students. Prerequisite: Biological Sciences or Psychology 396, or Biological Sciences 496, or written permission of instructors.

M W or T R 12:20–4:25; plus additional hours to be arranged. B. Land and staff.
Laboratory practice with neurobiological preparations and experiments, designed to teach the techniques, experimental designs, and research strategies used to study biophysical and biochemical properties of excitable membranes, sensory receptors, and the central nervous system transformations of afferent activity as well as the characteristic composition and metabolism of neural tissue. Theoretical content at the level of Aidley's *The Physiology of Excitable Cells*.

494 Junior Honors Spring. 4 credits. Prerequisite: admission to the department honors program. Staff.

498 Senior Honors Dissertation Fall. 4 credits. Prerequisite: admission to the departmental honors program. Staff.

499 Senior Honors Dissertation Spring. 4 credits. Prerequisite: admission to the departmental honors program. Staff.

Advanced Courses and Seminars

Advanced seminars are primarily for graduate students, but with the permission of the instructor, they may be taken by qualified undergraduates. The selection of seminars to be offered each term is determined by the needs of the students.

A supplement describing these advanced seminars is available at the beginning of each semester and can be obtained from the department office. Except where indicated, the following courses may be offered either term, and carry 4 credits unless otherwise indicated.

502 Practicum in Article Writing (May not be taken by undergraduates for credit.)

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

580 Experimental Social Psychology (also Sociology 580)

582 Sociocultural Stress, Personality, and Somatic Pathology (also Sociology 582)

583–584 Proseminar in Social Psychology (also Sociology 583–584)

585 Social Structure and Personality (also Sociology 585)

586 Interpersonal Interaction (also Sociology 586)

587 Personality (also Sociology 587)

588 Social Change, Personality, and Modernization (also Sociology 588)

591 Educational Psychology

595 Teaching of Psychology

[596 Improvement of College Teaching. Not offered 1981–82.]

[599 How to Generate Stimuli and Control Experiments with a Small Computer] Fall. Prerequisite for undergraduates: written permission of instructor before course enrollment. Not offered 1981–82.

M 1:25–3:35.
Individuals who expect to use the EPIC computer facility, or other small computer facilities, should register for this course.]

600 General Research Seminar 0 credits.

613 Seminar on Obesity and Weight Regulation (also Nutritional Science 613) 3 credits. Offered alternate years. First offered spring 1982.

T R 10:10–12:05. D. Levitsky.

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 and Women's Studies 685) Fall. Hours to be arranged. S. Bem.

690 Nutrition and Behavior (also Nutritional Sciences 690) Spring. 3 credits. Offered alternate years. Next offered spring 1983.

T R 10:10–11. D. Levitsky.

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 Research in Human Experimental Psychology****920 Doctoral Thesis Research in Social Psychology and Personality****930 Doctoral 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 Psychology Inquiry**124 Introduction to Psychology: The Cognitive Approach****128 Introduction to Psychology: Personality and Social Behavior****209 Developmental Psychology****215 Introduction to Linguistics and Psychology****281 Interpersonal Relations and Small Groups (also Sociology 281)****286 Nonverbal Behavior and Communication (also Sociology 286)****325 Introductory Psychopathology****381 Social Psychology****385 Theories of Personality****469 Psychotherapy: Its Nature and Influence****543 Psychological Testing****Romance Studies**

The Department of Romance Studies (J. Béreaud, chairman) offers courses in French literature, Italian literature, and Spanish literature. In addition, the department's program includes courses in French and Spanish languages and courses in French, Italian, and Hispanic culture. Through its course offerings and opportunities for independent study, the department seeks to encourage study of the interactions of the Romance literatures among themselves, with other literatures, and with other fields of inquiry.

See Modern Languages, Literatures, and Linguistics, p. 140.

Russian Literature

The Department of Russian Literature (G. Gibian, chairman) offers a variety of courses. In some courses the reading is done in translation and in others it is in the original Russian. In studying Russia, the connection between history, society, and literature is particularly close and for that reason instruction and discussion in class often include a variety of topics, such as culture and intellectual history, instead of being limited strictly to literature. Several

courses are interdisciplinary in character. Students interested in majoring in Russian are very strongly urged to take Russian 101 and 102 as soon as they can, preferably in the first year, at least in the second year. They then proceed with the language by taking 203 and 204, offered by the Department of Modern Languages and Linguistics and Russian 201–202, offered by the Department of Russian Literature. After 202, there is a further sequence of Russian literature courses in Russian.

See Modern Languages, Literatures, and Linguistics, p. 140.

Sociology

D. P. Hayes, chairman; R. K. Goldsen, director of undergraduate studies, 330 Uris Hall, 256–4266. H. Aldrich, P. D. Allison, R. Avery, S. Bacharach, B. Bowser, S. Caldwell, B. Edmonston, G. Elder, J. Jacobs, J. A. Kahl, W. W. Lambert, R. McGinnis, L. Meltzer, B. C. Rosen, R. Stern, J. M. Stycos, H. Trice, R. M. Williams, Jr.

Sociology deals with matters of social class, status, and power within groups, communities, societies, and across nations. Its specialties include analyses of social conflict and accommodation, the structure of and changes in population, organizations, and institutions, including the family, law, religion, and science. All public policy, local or national, is affected by these sociological issues.

Introductory Courses

There is no single introductory course in sociology. Sociology 101 will provide a traditional overview of sociology for those who desire it, but other alternative approaches to the field are offered in the 100 and 200 level courses. Any two courses at these levels will serve as adequate preparation for most advanced courses. The 100 and 200 level courses are open to all students and have no prerequisites unless otherwise specified.

The Major

Sociology provides a broad, liberal-arts perspective on society. It serves as the basis for a career in public policy or research, or as preprofessional training for graduate study in sociology itself or in such fields as law, business, public administration, planning and social welfare. To help the student organize a specific program within this large range, the department offers a series of alternative concentrations (with change from one to another usually permitted), as described below.

The director of undergraduate studies will help the prospective major to choose among the concentrations and will designate a faculty adviser for each student who is accepted into the program. A helpful pamphlet is issued each semester listing all the courses in sociology on campus (including those in other departments), organized by major topics. It is available in the department office, 318 Uris Hall.

Concentration I—Human Society permits a broad study of society on a comparative basis, combining humanistic and scientific approaches. The concentration is not tightly structured and the student will develop a personal plan in consultation with an adviser. *Prerequisites:* Any two courses in sociology at the 100 or 200 level with an average grade of B– or better.

Major program: Thirty-two additional credits in sociology, of which 12 may be in related departments (if acceptable to the adviser) as part of a coherent plan of study. At least 8 credits must be in courses at the 400 level or above.

Concentration II—Research Training is for students who aim for careers in public policy research or teaching. It prepares students for graduate work and provides training leading directly to post-baccalaureate jobs in research organizations.

Prerequisites: Any two courses in sociology at the 100 or 200 level with an average grade of B– or better, and one year of college mathematics, especially calculus and probability statistics (such as Mathematics 107–108 or Mathematics 111–112).

Major program: Students in this concentration must complete at least 44 additional credits of courses in sociology. These must include: (a) three courses in research methods, such as Sociology 321, 325, 424, 425; (b) two courses in sociological theory; (c) one semester of the honors sequence (Sociology 495) or a graduate seminar; and (d) at least two semesters of supervised research experience with faculty members in sociology.

Concentration III—American Institutions and Public Policy

centers on the analysis of key institutions in American society and the trends and conflicts that underlie current public issues. Considerable attention is given to sociological studies by government, academic, and private agencies that influence public policy.

Prerequisites: Any two courses in sociology at the 100 or 200 level with an average grade of B– or better.

Major program: An additional 34 credits, including (a) two courses in related fields chosen from Africana Studies 290, Economics 101, Government 111 or 302, History 312 or 341, or Industrial and Labor Relations 261; and (b) seven courses in sociology, including two courses in research methods such as Sociology 321 and 325, and two advanced courses chosen from Sociology 404, 441, 442, 462, or related graduate courses or seminars.

Concentration IV—Personality and Social Psychology

is offered in cooperation with the Department of Psychology. This concentration approaches personality and social psychology from a sociological perspective. To ensure a solid interdisciplinary grounding, students will be encouraged to develop some competence in psychology, cultural anthropology, and social institutions and processes.

Prerequisites: Two courses in sociology at the 100 or 200 level with an average grade of B– or better, including at least one from among Sociology 280, 281, 285, and 289.

Major program: Thirty-two additional credits, including two courses in sociological methods (Sociology 321 and 325 or equivalents), three courses in personality and social psychology, and two courses in social institutions and processes. Courses in cultural anthropology and experimental psychology may be included within the major if approved by the adviser. At least two courses must be at the 400 level or above.

Concentration V—Population Studies permits the intensive study of human populations from a social science perspective. Students are encouraged to combine population studies with a concentration in a related program such as women's studies, American studies, an area program, or biology and society.

Prerequisites: Sociology 230 plus one other course in sociology with an average grade of B– or better.

Major program: An additional 36 credits in sociology, including (a) Sociology 431 and either 321 or 325; (b) Sociology 378 or 430; (c) two additional courses in population or closely related fields. Of the total requirement for the major, 12 credits may be in related fields if approved by the adviser.

Honors. The honors program is designed to offer the opportunity for original research under direct guidance of a member of the faculty. For admission to the honors program, students should file an application with the department during their junior year or at the beginning of their senior year. Honors candidates must have a cumulative average of at least 2.7 and an average of 3.0 in sociology courses.

The level of honors is determined by the faculty on recommendation from the student's honors committee after presentation of the research report.

101 Introduction to Sociology Fall. 3 credits.

M W 12:20, plus one hour to be arranged.

Staff.

An introduction to basic aspects of social structure including culture, social roles, the nature of groups, and inequalities of wealth, honor, and power. Essential methods of social research are also covered, along with an overview of current research findings about American society.

[103 Myth and Image in Modern Society (also History of Art 105)] Fall. 3 credits. Not offered 1981–82.

T R 9:05, plus one hour to be arranged.

R. Goldsen, P. Kahn.

The course views myth as a universal human language. Its components are widely recognizable images and symbols, arranged in structures that validate the legitimacy of a society's moral order. The course, taught jointly by an artist and a sociologist, invites students to analyze certain mythic forms in American society, from mass-produced myths of the media to modern art.]

107 Introduction to Sociology: Conflict and Cooperation Spring. 3 credits. Limited to freshmen and sophomores.

M W F 10:10. R. M. Williams, Jr.

Are human societies fundamentally cooperative or conflictual? In what ways? Why? And with what consequences? Examination of contemporary sociological analyses and the views of such precursors as Hobbes, Marx, Sumner, and Simmel. Data from recent studies of conflict and conflict reduction are discussed.

120 Society, Industry, and the Individual I (also I&LR 120) Fall. 3 credits.

H. Aldrich.

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.

[141 Introduction to Sociology: Applications to Policy] Fall. 3 credits. Not offered 1981–82.

M W F 10:10. S. Caldwell.

Concentrates on sociology applied to actual decisions by regulatory commissions, executive agencies, courts, Congress, and other public policymakers. How does sociology become useful? Who makes it useful? What effects do personal values have on its uses? How well does expert knowledge coexist with political process? For fall 1982, the course will cover topics such as welfare reform, teenage pregnancies, Social Security, daycare school effectiveness, a national family policy, and energy.]

172 Introduction to Sociology: Urban Society Fall. 3 credits.

M W F 2:30. B. Bowser.

The sociological analysis of urbanism and urbanization. Alternative explanations of industrial urban development are assessed with a specific focus on historical and contemporary urban community studies that serve as models of social structure and group (class, ethnic, race) divisions. Trends in the United States and in other countries are also examined, using such information as a basis for considering contemporary problems and the urban future.

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.

[222 Studies In Organizational Behavior: Regulating the Corporation (also I&LR 222)] Fall. 3 credits. Not offered 1981–82.

T R 10:10. R. Stern.

Public and private power from an organizational perspective. The resource dependence approach to organization-environment relations provides a framework for interpreting government attempts at the regulation of corporate behavior. Topics cover the structure and functioning of government regulatory agencies and corporate responses to regulation, including strategy, change, and political influence. The role of interest groups such as consumer or citizens' organizations is also considered. Research and case materials focus on the implementation of environmental protection, occupational health and safety equal opportunity, antitrust, and rate-setting regulations.]

230 Population Problems Spring. 3 credits; 4-credit option available.

T R 10:10–11:25, and 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 American Women and the Female Professions, 1815–Present (also Women's Studies 238 and HDFS 258)] Fall. 3 credits.

T R 2:30–4. J. Brumberg.

The historical evolution of the female professions in America, including prostitution, midwifery, nursing, teaching, librarianship, social work, and medicine. Lectures, readings, and discussions are geared to identifying the cultural patterns which fostered the conception of gender-specific work and the particular historical circumstances which 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.

242 Social Welfare in Europe and North America Spring. 3 credits. Prerequisite: at least one course in sociology.

M W F 9:05. S. Caldwell.

This course will examine the nature and origin of the welfare state and some of its problems. Drawing on historical, comparative, and statistical evidence, we ask how particular welfare state programs (such as Social Security, health, housing, income maintenance, et. al) affect individuals, families, communities, and eventually the entire economy and society. How would life be different without welfare state programs? How serious are the problems facing the Western welfare states? What social choices face the welfare states, and what are the most likely directions in the future?

243 Family Fall. 3 credits (4-credit option available).

T R 10:10 and hour to be arranged. B. C. Rosen.

A social and historical analysis of the family both in the West and cross-culturally. Specific areas examined include sex roles, socialization, mate selection, sex and sexual controls, internal familial processes, divorce, disorganization, and social change.

245 Inequality in America Fall. 3 credits (4-credit option available).

M W F 1:25. J. Kahl.

Recent trends in the unequal distribution of income, occupation, and education in the United States; inheritance of riches and of poverty; importance of ethnic membership; sex differences; deliberate attempts by government policy to alter these trends; evaluation of the "war on poverty."

[248 Politics in Society] Spring. 3 credits (4-credit option available). Not offered 1981–82.

T R 2:30–4. Staff.

An examination of the relations between economic, social, and political structures in industrial societies, with particular emphasis on the United States. Topics included are democratic forms of participation in organizations and society at large, social movements, party systems, the structure of power and its legitimation, and voting behavior.]

[252 Public Opinion] Spring. 4 credits. Not offered 1981–82.

T R 9:05 and hour to be arranged. R. Goldsen.

Analysis of television as a social institution—how it defines social roles (e.g., race and sex) and alters the cultural habitat within which public opinion forms. New communications techniques and their social significance are analyzed.]

[255 Sociology of Science and Technology] Fall. 3 credits (4-credit option available). Not offered 1981–82.

T R 2:30 and hour to be arranged. P. Allison.

How the growth of knowledge is facilitated and impeded by the social behavior of scientists, including competition, teamwork, communication, secrecy, conformity, and deviance: causes and consequences of scientific revolutions; factors affecting scientific careers; history of science as a social institution.]

265 Hispanic Americans Spring. 3 credits (4-credit option available).

T R 2:30–4. H. Velez.

Analysis of the present-day Hispanic experience in the United States. An examination of sociohistorical backgrounds as well as the economic, psychological, and political factors that converge to shape and influence a Hispanic group-identity in the United States. Perspectives are developed for understanding the diverse Hispanic migrations, the plight of Hispanics in urban and rural areas, and the unique problems faced by the different Hispanic groups. Groups studied include Dominicans, Chicanos, Cubans, and Puerto Ricans.

277 Psychology of Sex Roles (also Psychology 277 and Women's Studies 277)] Spring. 3 credits (4-credit option available). Prerequisite: an introductory psychology course.

T R 2:30–4. S. Bern.

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 attendance at the optional section meeting, and the term paper. Prerequisite: an introductory psychology course.

T R 10:10–11:25. D. Bern.

An introduction to research and theory in social psychology. Topics include human processing of social information; social influence, persuasion, and attitude change; social interaction and group phenomena. The application of social psychological knowledge to current social problems will also be discussed.

284 Social-Psychological Theories and Applications (also Psychology 284) Fall. 3 credits.

T R S 9:05 (S class is held at discretion of instructor). L. Meltzer.

Emphasis is given to those aspects of personality and social psychology which have led to effective practical applications or which provide reasonable insights into the genesis and/or amelioration of social and personal problems.

[307 Collective Behavior and Social Movements (also HDFS 307)] Fall. 3 credits (4-credit option available). Not offered 1981–82.

T R 2:30–4. G. Elder.

An inquiry into social behavior that breaks with institutionalized or conventional forms, such as acting crowds, riots, social movements, and revolution. Analysis of antecedent conditions, emergent forms, processes, and consequences. Historical and contemporary studies are covered.]

310 Sociology of War and Peace Spring. 4 credits.

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.

321 Field and Laboratory Techniques in Sociology Fall. 4 credits. Prerequisite: a course in sociology.

T R 10:10–11:25; lab, 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 I&LR 324)] Spring. 3 credits. Limited to 40 students. Prerequisite: one or more courses in both sociology and psychology. Not offered 1981–82.

H. Trice.

Focus is on the relationship between organizations and deviant behavior. Covers (1) the nature and etiology of psychiatric disorders, particularly schizophrenia, the psychoneuroses, and psychosomatic disorders; (2) organizational factors related to these disorders and to the more general

phenomena of role conflict and stress; (3) an examination of alcoholism as a sample pathology, in terms of personality characteristics and precipitating organizational factors; (4) evaluation of organizational responses to deviance; (5) the nature of self-help organizations such as Alcoholics Anonymous; and (6) the structure and functioning of the mental hospital.]

325 Evaluating Statistical Evidence Spring. 4 credits.

M W F 10:10. S. Caldwell.

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.

329 Sociological Analysis of Organizations (also I&LR 329) Fall. 3 credits. Prerequisites: I&LR 120 and 121 or equivalent.

S. Bacharach.

This course attempts to introduce students to the basic issues involved in the sociological analysis of organizations. It traces organizational theory from Max Weber to the most recent research. Among the themes to be discussed are: internal structure of organizations, communication in organizations, decentralization, organizational change, organizational technology, and organizational environment.

[348 Sociology of Law] Fall. 4 credits. Not offered 1981–82.

M W 1:25 and hour to be arranged. J. Jacobs.

The subject matter and course materials vary. In 1979 the course focused on civil rights and civil liberties in the context of institutions of social control. The main theme is that the extension of constitutional rights to such "marginal" citizens as prisoners, mental patients, students, and soldiers has created something of a crisis in the authority for the institutions with which these groups are associated. The basis of institutional authority and order is explored in light of the drive to expand personal rights. Readings consist of a casebook of legal decisions and excerpts from legal and sociological studies.]

[352 Prisons and Other Institutions of Coercion]

Spring. 4 credits. Prerequisite: a course in the social sciences. J. Jacobs. Not offered 1981–82.]

355 Social and Political Studies of Science (also Science, Technology, and Society 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. The focus is on its relationship to government, the media, religion, and education. Drawing from recent controversies over science, such questions as ethics and social responsibility in science, struggles to maintain internal control over research and over the teaching of science, and the concept of limits to inquiry are discussed.

[356 Contemporary Sociology for Scientists and Engineers] Spring. 4 credits. Prerequisite: elementary finite mathematics or consent of the instructor. R. McGinnis. Not offered 1981–82.]

357 Medical Sociology Spring. 4 credits.

Prerequisite: a course in the social sciences.

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.

364 Race and Ethnicity Fall. 3 credits (4-credit option available).

T R 10:10–11:25. C. Hirschman.

An examination of the dynamics of race and ethnic relations in the United States and other societies.

Alternative explanations—melting pot assimilation theories, internal colonialism, and Marxist perspectives—are compared and evaluated. Topics include: an historical comparison of black and white immigrants, the case of Asian-Americans, the causes and consequences of residential segregation, and women as a minority group. Other multiethnic societies, such as South Africa and Malaysia, are also studied.

[365 Criminology] Spring. 4 credits. Not offered 1981–82.

M W 2:30 and one hour to be arranged. J. Jacobs.

This course examines crime as a social phenomenon. It takes both a historical and a cross-cultural approach in order to investigate the processes by which different societies generate different crime problems. Attention is paid to the historical evolution of criminology as a discipline and to the most prevalent theories of criminology and crime causation. Special attention is also placed on such topics as white-collar crime, organized crime, and youth gangs. In light of the analysis of crime as a social phenomenon various strategies of crime control are considered critically.]

[367 After the Revolution: Mexico and Cuba] Fall. 4 credits. Prerequisites: two courses in the social sciences. Not offered 1981–82.

M W F 1:25. J. Kahl.

A comparison of the economic, political, and social development of Mexico and Cuba following their revolutions. Assigned readings will be in English.]

368 Twentieth-Century Brazil (also History 348)

Spring. 4 credits. Prerequisites: two courses in the social sciences.

M W F 1:25. J. Kahl, T. Holloway.

A study of the style of development in economy, polity, and society followed by contemporary Brazil, and an analysis of the contradictions that led to the military coup of 1964 and its aftermath. Some comparisons with other Latin American countries are made. Assigned readings are in English.

378 Economics, Population, and Development (also Economics 378) Fall. 4 credits.

M W F 10:10. 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.

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.

T R 1–2:15. 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.

T R 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)

Fall. 4 credits. Prerequisites: a course in psychology and one in either sociology or social or cultural anthropology; or permission of instructor.

M W F 12:20. W. W. Lambert.

A critical survey of approaches, methods, discoveries, and applications in emerging attempts to study human nature, experience and behavior

cross-culturally. Focus on studies of cognition, values, socialization, sociolinguistics, personality, attitudes, stereotyping, ideology, sociocultural development, and mental illness. Problems of how one can learn another culture will also be dealt with.

[385 Theories of Personality (also Psychology 385)] Spring. 4 credits. Prerequisite: Psychology 101, 128, or 275 or permission of the instructor. Not offered 1981–82.

M W F 12:20. 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.]

[386 Human Ethology (also Psychology 386)] Spring. 4 credits. Prerequisite: a course in social psychology or animal social behavior or permission of instructor. Offered alternate years. Not offered 1981–82.

T R 2:30–4. R. Johnston.

Biological and other approaches to human social behavior will be examined using naturalistic observation techniques. One emphasis will be on parallels between nonhuman vertebrates and humans. Topics include nonverbal communication, use of space, bonding, and interaction rituals.]

404 Intermediate Sociological Theory (also Rural Sociology 404) Fall. 4 credits.

T 2:30–5. J. Kahl.

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.

420 Mathematics for Sociologists (also CRP 520) Fall. 1–4 credits.

M W 2:25–4:30; lab, F 2:25–4:30. R. McGinnis. Elementary matrix algebra, probability theory, and calculus.

[422 Sociology of Industrial Conflict (also I&LR 425)] Spring. 4 credits. Not offered 1981–82.

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 I&LR 423) Fall. 3 credits.

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 325) and matrix algebra.

T R 10:10–11:40. R. McGinnis.

The general linear regression model with interval scaled variables. Detecting violations of assumptions of the model in real data and providing remedies. Both single and multiple equation models (including path analysis).

[425 Categorical Data Analysis] Fall. 4 credits. Prerequisite: Sociology 424 or equivalent. Not offered 1981–82.

T R 10:10–11:45. P. Allison.

Techniques for including categorical (discrete) variables in multivariate models. Log-linear analysis of multidimensional contingency tables; dummy variable regression; logit, probit, and regression models with categorical dependent variables. Emphasis on applications.]

426 Policy Research (also Rural Sociology 426) Spring. 3 credits. Prerequisite: a course in multivariate statistics.

Hours to be arranged. S. Caldwell.

Case studies of recent research sponsored and carried out with the explicit purpose of affecting policy. Since policy research often requires unusually rigorous evidence, we assess the strengths and weaknesses of alternative research designs: experimental versus observational; aggregate versus micro; longitudinal versus cross-sectional; large samples versus case studies. Since policy research often faces strong pressures, we examine the politics of putting research questions on the agenda, preserving the investigator's independence, and interpreting research results. Other topics include: academic and nonacademic settings for policy research; policy research and the disciplines; forecasting; simulations; careers in policy research.

[427 The Professions: Organization and Control (also I&LR 427)] Fall. 4 credits. Not offered 1981–82.

T R 1:25. 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.]

429 Theories of Industrial Society (also I&LR 426) Fall. 4 credits. Prerequisites: I&LR 120 or any 100- or 200-level sociology course, and permission of instructor.

Hours to be arranged. S. Bacharach.

Some of the critical issues in social theory to be found in the works of Durkheim, Marx, Pareto, and Weber.

Their views of man's relation to society are compared to the views of such literary figures as Balzac, Beckett, Camus, Flaubert, Goethe, Sartre, Stendhal, and Zola.

430 Social Demography Spring. 4 credits. Prerequisites: junior class standing or permission of instructor.

T R 2:30–3:45. C. Hirschman.

A survey of the methods, theories, and problems of contemporary demography. Special attention is directed to the social determinants and consequences of fertility, mortality, and migration. The populations of both developed and developing areas are examined.

431 Techniques of Demographic Analysis Fall. 4 credits. Prerequisite: Sociology 230 or 330.

M W 2:30, and hour to be arranged. B. Edmonston.

A description of the nature of demographic data and the specific techniques used in their analysis. Mortality, fertility, migration, and population projection are covered, as well as applications of demographic techniques to other types of data.

[434 Human Fertility in Developing Nations] Fall. 4 credits. Offered alternate years. Prerequisite: Sociology 230 or permission of instructor. Not offered 1981–82.

T 2:30–4:25. 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.]

[440 Educational Institutions] Spring. 4 credits. Not offered 1981–82.

T R 10:10–11:35. Staff.

The role of educational institutions in industrialized societies is studied. The primary focus will be on the debate between those who see educational institutions as extending opportunity and assimilating marginal groups and others who see them as arenas of conflict in which privileged groups successfully struggle to maintain their advantages.]

441 Structure and Functioning of American Society Fall. 4 credits. Prerequisite: a course in sociology or permission of instructor.

M W F 9:05. R. M. Williams, Jr.

Analysis of a total societal system. Critical study of the institutions of kinship, stratification, the economy, the polity, 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.

[445 Law and Social Theory] Spring. 4 credits. Prerequisite: Sociology 348 or permission of instructor, or graduate standing. Not offered 1981–82.

T 3:35–5:30. J. Jacobs.

Major intellectual traditions contributing to what is loosely called the sociology of law. Attention is paid to the classical theorists—Weber, Durkheim, and Marx—as well as to contemporary American and European legal and sociological scholars. The underlying theme is the relationship of law to social order.]

[454 Religion and Secularism in Western Society] Spring. 4 credits. Prerequisite: Sociology 101 or permission of instructor. Not offered 1981–82.

M W F 9:05. Staff.

The interrelationship of culture, society, and religion. Religion and social stratification, religion and economic and political institutions, social change and religion. The major emphasis will be on American society and American religious institutions.]

[462 Society and Consciousness] Spring. 4 credits. Limited to 15 students. Prerequisite: permission of instructor. Not offered 1981–82.

Hours to be arranged. R. Goldsen.

An examination of the role of the social system in the formation of human consciousness.]

480 Seminar: Attitude Theory (also Psychology 480) Fall. 4 credits. Prerequisite: some familiarity with the topic of attitudes from prior courses, or permission of instructor.

R 2–4:25. L. Meltzer.

The seminar will cover three approaches: (1) The reasoned action theory of Fishbein and Ajzen. (2) The balance theory of Fritz Heider, and its many derivatives. (3) The functional theories in psychology (Daniel Katz), psychoanalysis (Freud and others), and cultural anthropology (Marvin Harris). The historical roots and current status of each approach will be analyzed. Students will read original source material rather than textbooks.

481 Advanced Social Psychology (also Psychology 481) Fall. 4 credits. Limited to 30 students. Prerequisite: a course in social psychology or permission of instructor.

T R 10:10–11:25. D. Regan.

Selected topics in social psychology are examined in depth, with heavy emphasis on experimental research. Readings are usually original research reports. Topics discussed may include: social comparison theory, social and cognitive determinants of the emotions, cognitive dissonance, attribution processes, interpersonal attraction, and research methods in social psychology.

[483 Socialization and Maturity (also Psychology 483)] Spring. 4 credits. Limited to upperclass and graduate students or those who receive permission of instructor. Prerequisite: some work in psychology, sociology, and/or anthropology; some background in statistics is assumed. Not offered 1981-82.

T R 12:20-2:15. 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.]

[484 Individual Differences and Psychological Assessment (also Psychology 484)] Spring. 4 credits. Prerequisites: introductory course in psychology or sociology and a course in statistics and junior standing. Not offered 1981-82.

T R 10:10-12:05. D. Bem, R. Darlington.

An analysis of current methods and models for assessing individual and group differences. Particular emphasis is on the measurement of personality. Quantitative models for predicting behavior from assessment instruments are examined, and current controversial issues in assessment are discussed.]

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.

M W F 12:20. 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.

488 Research Practicum in Socialization (also Psychology 488) Spring. 4 credits. Prerequisites: two courses in social psychology or human development and one course in statistics, or permission of instructor.

R 2:30-4:25. U. Bronfenbrenner.

Supervised participation in field and experimental studies bearing on the impact of family support systems on socialization practices and outcomes. The work concentrates on the American phase of a project being conducted cooperatively in five industrialized societies.

491 Selected Topics in Sociology Fall or spring. 2-4 credits. Prerequisite: permission of instructor. Hours to be arranged.

495 Honors Research: Senior Year Fall or spring. 4 credits. Limited to sociology majors. Prerequisite: permission of instructor. Hours to be arranged. D. Hayes and staff.

496 Honors Thesis: Senior Year Fall or spring. 4 credits. Prerequisite: Sociology 495. Hours to be arranged. D. Hayes and staff.

497 Social Relations Seminar (also Anthropology 495) Spring. 4 credits. Limited to seniors majoring in social relations. Staff.

Graduate Seminars

These seminars are primarily for graduate students but may be taken by qualified advanced undergraduates who have permission of the instructor. Which seminars are to be offered any term is determined in part by the interests of the students, but it is unlikely that any seminar will be offered more frequently than every other year. Lists and descriptions of seminars are available from the department well in advance of each semester. The list below indicates seminars that are likely to be offered 1981-82, but others may be added. Students should

check with the department before each term. All seminars are offered for 4 credits unless otherwise specified.

[521 Organizational Behavior II (also I&LR 521)] Spring. 3 credits. Not offered 1981-82. 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 1981-82.

Hours to be arranged. P. Allison.

Multivariate statistical methods with explicit treatment of measurement error. Classical test theory, path analysis of unmeasured variables, econometric "errors-in-variables" models, confirmatory factor analysis, and Joreskog's general model for estimating linear structural relations (LISREL). Introduction to latent structure analysis. Emphasis on applications.]

531 Population Policy (also Biology and Society 403) Fall. 4 credits. Prerequisite: graduate standing or permission of instructor.

W 3:35-5:30. J. M. Stycos.

The ways in which societies try to affect demographic trends. Special focus is on government policies and programs to influence fertility.

[541 Social Organization and Change] Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. Not offered 1981-82.

M W 1:25-3:20. R. M. Williams, Jr.

Systematic review of theory and research, with emphasis on substantive knowledge and testable hypotheses. Subjects included are social processes, social structures, cultural content, and social and cultural change. Attention is given to the nature and size of the social system (small groups, communities, large organizations, societies) and also to both macro- and micro-social processes and properties (integration, authority, conformity, and deviance).]

585 Social Structure and Personality (also Psychology 585) Fall. 4 credits.

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.

621 Growth of the World Capitalist-Industrial System (also I&LR 621) Spring. 4 credits. Enrollment limited. Prerequisite: permission of instructor.

H. Aldrich.

This course examines the origins of the world-scale capitalist system from the sixteenth century through the beginnings of large-scale industrialization in the U.S. in the late nineteenth century. Emphasis is on concepts and methods for world-systems analysis rather than on detailed historical knowledge of a specific era. The relevance of world-systems analysis for current international sociopolitical phenomena, including underdevelopment and the rise of multinational corporations, is discussed. Students play major role in leading class discussions and in choosing topics for discussion.

632 Research Seminar in Population Spring. B. Edmonston.

[645 Social Networks] Spring. 4 credits. Not offered 1981-82.

Hours to be arranged. Staff.

An examination of the patterns of linkage between people, organizations, and institutions as constituting the foundation of social structure. These patterns and

their implications are explored in areas such as the sociology of science and the study of power and influence. Theoretical and methodological issues receive equal attention.]

646 Seminar: Social Stratification Spring. R 2:30-4:30. J. Kahl.

658 History and the Life Course (also HDFS 686) Spring. 3 credits. S-U grades optional. Enrollment limited to 15. Prerequisite: permission of instructor. Human Ecology students must register for HDFS 686. Hours to be arranged. G. Elder.

An introduction to the life course as a theoretical orientation, methodology, and field of study. Special emphasis is devoted to multidisciplinary convergence on life course problems; to theory and research on the interaction of social, psychological, and biological processes from birth to death; and to historical influences.

677 Seminar in Field Research (also I&LR 677) Spring. 3 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 on-going research project is explored.

683 Social Interaction (also Psychology 683) Spring.

Hours to be arranged. D. Hayes, L. Meltzer.

685 Sex Differences and Sex Roles (also Psychology 685 and Women's Studies 685) Fall. 4 credits.

Hours to be arranged. S. Bem.

691-692 Directed Research Fall or spring. Up to 4 credits, to be arranged. Prerequisite: permission of instructor.

695 Thesis Research Fall or spring. Up to 6 credits, to be arranged. Prerequisite: permission of thesis director.

Swahili

See Africana Studies and Research Center, p. 182.

Theatre Arts

Drama, Dance, Film

D. L. Frederickson, acting chairman; R. Archer, V. A. Becker, M. Boyan, S. R. Cole, P. J. Curtis, R. Dressler, M. Dixey, J. Gregg, J. Haarstick, director of undergraduate studies, E. Johnson, M. Lawler, J. Morgenroth, S. Perkins, P. Saul, R. Shank, A. Van Dyke, S. Williams

Through its courses and production laboratory, 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 can serve as either a broad liberal arts approach to the study of people and their culture, or preprofessional training for further study in acting, directing, design, technology, dramatic criticism, theatre history, playwrighting, arts administration, dance, and film. The

department also provides members of 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 240.
- 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

Requirements:

- 1) Theatre Arts 240, 250, 280.
- 2) A minimum of four laboratory courses chosen from Theatre Arts 151, 155, 251, 351, 451, and 561. At least one term of 151 and 155 must be taken. Majors are required to take at least one laboratory course a year in their junior and senior years.
- 3) Two courses in theatre studies chosen from 325, 326, 327, 333, 334, 335, 336, 424, 434, 436, 442.
- 4) Four courses (at least 12 credit hours) in other departmental courses.
- 5) Two courses in related areas outside the department.
- 6) Courses in which a student receives a grade below C cannot be used to fulfill the major.

Film Concentration

Requirements:

- 1) Theatre Arts 240, 250, 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) either Theatre Arts 475 or 477
- 4) 8 credits in other theatre arts courses
- 5) 12 additional credits of related work outside the department.
- 6) An average of C+ or better in all theatre arts courses.

Dance Major

The dance program is located 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, 315, 316.
- 3) Twenty additional credits in related fields chosen in consultation with advisers.

Theatre Colloquium

On announced dates during the year, the entire department—faculty, undergraduates, and graduate students—meets on Fridays, 12–2 p.m. in Lincoln 101. These sessions, which take the form of guest lectures, demonstrations, research presentations, and critiques of major Theatre Cornell productions, are designed to encourage a broad, coherent understanding of the integration of all components of theatre in its various forms.

Departmental Honors Program

Candidates for the degree of Bachelor of Arts with honors in theatre arts must fulfill the requirements of the major and maintain an average of B+ in departmental courses and an average of B in all courses. Any such student may, at the beginning of the second semester of the junior year, form a committee of three faculty members to guide and evaluate the honors work. The work will culminate in an honors thesis or practicum to be presented not later than April 1 of the senior year, and an examination to be held not later than May 1.

Theatre Laboratory

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 151, 152, 251, 351, and 451. These courses progress from elementary crew participation to full design, technical, and stage management assignments. Laboratories should be scheduled along with allied content courses when possible.
- 2) Rehearsal and Performance Laboratory: Students may enroll in 155 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 may also participate in Theatre Cornell productions on an extracurricular basis.

The Dance Program

Courses in dance technique are offered each semester—modern: four levels, fundamentals through advanced; and ballet: elementary and intermediate. 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 dance are offered on a rotating basis. Students may satisfy the physical education requirement by taking any of these courses. Up to four units of academic credit may be earned (one each semester) for enrollment in intermediate or advanced technique only (see Theatre Arts 304, 306, 308). Schedules for technique classes are available in the Dance Office, Helen Newman Hall.

Students may receive credit for performance in student-faculty concerts. Repertory and performance workshops will be offered in which staff will choreograph and conduct rehearsals for performance of original dance works. Admission is with permission of the instructor. Hours will be arranged through the dance office, Helen Newman Hall. One academic credit (S-U grades only) may be earned for this (see Theatre Arts 155, Rehearsal and Performance).

Film Study Abroad

The College of Arts and Sciences, through this department and in consort with fifteen other colleges and universities, offers up to a full year's study at the Centre Universitaire Americain du Cinema a Paris. 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 120, 130, or 140. Interested students should consult the Freshman Seminar booklet for further information.

Freshman Seminars

120 Modern Drama and Modern Production Fall and spring. 3 credits.

T R 12:20–1:35. J. Haarstick.

This course will examine works by major European and American playwrights from 1880 to the present. Stress will be placed upon dramatic and theatrical approaches as related to the intellectual and philosophical concerns of this century. Readings will be taken from the works of Ibsen, Chekhov, Pirandello, Ionesco, Stoppard, Pinter, and modern American dramatists.

130 Tragedy and Comedy Fall and spring. 3 credits.

M W F 12:20. R. Short.

Readings of principal plays in the traditions of theatrical tragedy and comedy. Among the playwrights studied will be Sophocles, Shakespeare, Moliere, O'Neill, et cetera. The objective of the course is two-fold: to develop an appreciation of the plays as poetry and literature, and to work toward a clear understanding of what is involved in the classification of a work as "tragic" or "comic."

140 Script and the Stage Fall and spring. 3 credits.

M W F 9:05. V. Kunimer.

In this course we will examine works of the twentieth-century American theatre from the point of view of the director. We will consider the relationship between dramatic literature and theatrical production and the process by which drama becomes theatre. Our texts will be drawn from such writers as Eugene O'Neill, Tennessee Williams, Elmer Rice, and Sam Shepard.

Acting

280 Introduction to Acting Fall or spring. 3 credits. Each section limited to 16 students.

Prerequisite: registration only through department roster in 104 Lincoln Hall.

Sec 1, M W 2:30–4:25 (primarily for prospective majors and those planning further performance courses); A. Van Dyke. Sec 2, M W 10:10–12:15; M. Hillyer. Sec 3, T R 12:20–2:15; R. Neal. Sec 4, T R 12:20–2:15; J. Smits. Sec 5, T R 12:20–2:15; T. Simmons. Sec 6, T R 12:20–2:15; M. Stockhaus. Sec 7, T R 12:20–2:15; J. Levo.

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; audition and registration only through department roster in 104 Lincoln Hall.

Sec 1, M W 2:30–4:25; S. Cole. Sec 2, T R 2:30–4:25; A. Van Dyke.

Practical exploration of the actor's craft through improvisation, exercises in physical and psychological action; problems in the use of imagination, observation, and research as tools for exploring the script.

380 Acting II—Characterization Fall or spring. 3 credits. Limited to 12 students. Prerequisites: Theatre Arts 281; permission and registration only through department roster in 104 Lincoln Hall.

T R 10:10–12:05. 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 or spring. 3 credits.

Sections limited to 10 students. Prerequisites: Theatre Arts 380, permission, and registration only through department roster in 104 Lincoln Hall.

T R 2:30–4:25. Staff.

Practice and application of skills and methods to various styles of dramatic literature; practical exploration of historical and social influences as determinants of style.

282 Introduction to Voice and Speech for Performance Fall. 2 credits. Limited to 12 students.

Primarily for department majors. Prerequisite: registration only through department roster in 104 Lincoln Hall.

M W 8–9:55. E. Johnson.

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. Prerequisites: Theatre Arts 282;

registration only through department roster in 104 Lincoln Hall.

M W 8–9:55. E. Johnson.

Development of vocal technique with additional emphasis on articulation and basics of Standard American pronunciation.

575 American Mime Orientation I Fall. 2 credits.

Prerequisite: Theatre Arts 280. Students enrolled in American Mime must contact the Department of Theatre Arts about supplies one month before the beginning of classes. Registration only through department roster in 104 Lincoln Hall.

F 2–4:25. P. Curtis and other teachers from the American Mime Theatre.

American Mime is a unique performing art created by a particular balance of playwriting, acting, moving, pantomime, and theatrical equipment. It is a complete theatre medium defined by its own aesthetic laws, terminology, techniques, script material, and teaching methods, in which nonspeaking actors, in characterization, perform the symbolic activities of American Mime plays through movement that is both telling and beautiful.

576 American Mime Orientation II Spring.

2 credits. Prerequisite: Theatre Arts 575 or permission of instructor. Registration only through department roster in 104 Lincoln Hall.

F 2–4:25. P. Curtis and other teachers from the American Mime Theatre.

A continuation of Theatre Arts 575.

701 Stage Movement and Combat Fall and

spring. 2 credits; limited to students in M.F.A. professional actor training. May be repeated for credit.

M. Boyan, J. Gregg, P. Saul.

Development of the physical body for expression through various techniques and practice, including effort-shape, improvisation, composition; modern dance and ballet; period dance; stage combat technique in foil, epee, sabre, and dagger, tumbling, aikido and stage fighting; combat choreography.

730 Dramatic Text Analysis Fall or spring.

2 credits; may be repeated for credit. Limited to students in M.F.A. professional actor/director training program. Others by permission of instructor.

M W F 1:15–2:15. P. Vogel.

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.

R. Shank.

Study, development, and performance of assigned roles.

752 Rehearsal and Performance Spring.

2 credits. Limited to students in M.F.A. professional actor training. Repeated for credit.

R. Shank.

Study, development, and performance of assigned roles.

780 Acting Technique I Fall and spring. 2 credits;

may be repeated for credit. Limited to students in first-year M.F.A. professional actor/director training.

Sec 1, M W 2:30–4:25; Staff. Sec 2, T R 2:30–4:25;

S. Cole.

Study and practice of fundamental techniques and methodologies. Exploration and use of the basic dynamics of the actor's organism.

781 Acting Technique II Fall and spring. 2 credits;

may be repeated for credit. Prerequisite: Theatre Arts 780. Limited to students in second-year M.F.A.

professional actor training.

M T W R 2:30–4:25. Staff.

Development and integration of the personal dynamic into the total acting process.

782 Voice Technique I Fall and spring. 2 credits;

may be repeated for credit. Limited to students in the first-year M.F.A. professional actor/director training.

M W F 10:45–12:30, T R 1:15–2:15. E. Johnson.

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;

may be repeated for credit. Prerequisite: Theatre Arts 782. Limited to students in second-year M.F.A.

professional actor training.

T R 10:45–12. E. Johnson.

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;

may be repeated for credit. Limited to students in first-year M.F.A. professional actor/director training.

T R 10:45–12. A. Van Dyke.

Ear training; sound designation of vowels, consonants, and diphthongs through exercises; sound symbolization through use of the International Phonetic Alphabet (IPA); eradication of regionalisms; development of Standard American speech.

785 Speech Technique II Fall and spring.

2 credits; may be repeated for credit. Prerequisite: Theatre Arts 784. Limited to students in second-year M.F.A. professional actor training.

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.

698 Directing Technique Fall and spring.

4 credits; may be repeated for credit. Limited to students in the M.F.A. professional acting/directing program; others by permission of the instructor.

R. Shank.

Approaches to directorial controls for text, actors, time, structure, movement, space, and design, towards the development of a production concept

from script to stage to audience. Practicums include work with actors, assistant director assignments, and the directing of complete short works.

798 Form and Style in Directing Fall and spring.

4 credits; may be repeated for credit. Limited to students in the M.F.A. professional acting/directing program; others by permission of the instructor.

R. Shank.

An exploration of major dramatic forms through analytical, interpretative, psychological and technical methods for the director's realization of inherent values towards a coherent production style.

Practicums include the direction of full length works each term.

Directing

398 Directing I Fall. 3 credits. Prerequisites:

Theatre Arts 250, 280, and permission of instructor.

M W 2:30–4:25. R. Shank.

An exploration of the role of the director through study and exercises: the process of conceptualization, use of visual, temporal, and dramatic values for interpretation of the script; directorial text analysis; applied projects.

498 Directing II Spring. 4 credits. Prerequisites:

Theatre Arts 398 or permission of instructor.

M W F 2:30–4:25. R. Shank.

Use of movement and space; character development techniques; rehearsal process; production procedures; applied project in performance.

499 Projects in Directing Fall or spring. Credit to

be arranged. Prerequisite: permission of the instructor.

R. Shank.

The planning and execution of directing projects by advanced students in the public performance facilities of the Department of Theatre Arts.

Rehearsal and Performance Laboratory

155 Rehearsal and Performance Fall and spring.

1–2 credits; 1 credit per production experience per term up to 2 credits per term. S-U grades only. 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.

M. Hillyer.

The study, development, and performance of roles in departmental theatre and/or dance productions.

Theatre Design and Technology

250 Fundamentals of Theatre Design and

Technology Fall or spring. 4 credits. Not offered to first-term freshmen.

Lec-lab, M W F 2:30–4:25. Staff.

An introduction to the design and technical experience in the theatre with particular attention to the unique collaboration of director, designer, and technician. Lectures, discussions, and extensive project work will relate the visual principles of designing scenery, costumes, lighting and sound 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.

260 Visual Concepts for the Theatre Fall.

3 credits.

T R 10:10–12:05. V. Becker.

A studio examination of the visual expression of ideas and concepts which focuses on developing the creative design process. Begins with the translation of simple thoughts and emotions into the visual language by which a designer can communicate with an audience. Concentrates on practical application of this process to the complex objectives of design and directing in the theatre.

261 Production Concepts for the Theatre Spring. 3 credits.

T R 10:10–12:05. R. Archer.

A studio examination of the physical expression of environment within the theatre which focuses upon the personal understanding and application of spatial and structural concepts. Material, scale, proportion, texture, and other elements are explored as techniques for achieving the design and technical objectives of theatre production.

362 Lighting Design and Technology Spring.

4 credits. For majors and qualified nonmajors in related fields. Prerequisite: Theatre Arts 250 or permission of the instructor.

T R 10:10–12:05. R. Dressler.

An exploration of the role of light as an expressive design medium for the interpretation of plays in the theatre. Will explore the visual nature and dramatic impact of light, the design process and its associated communication techniques, and lighting practices in the professional world.

363 Advanced Lighting Design and Technology

Fall. 4 credits. Prerequisite: Theatre Arts 362 and permission of the instructor. May be repeated for credit.

T R 10:10–12:05. R. Dressler.

An exploration of lighting design and technology on a more advanced level with particular stress upon project work and occasional production assignments.

364 Scene Design and Technology Fall. 4 credits.

For both majors and qualified nonmajors in related fields. Prerequisite: Theatre Arts 250 or permission of the instructor.

M W 12:20–2:15. R. Archer and V. Becker.

A study of the basic problems of design and technology of scenery for the stage. Will explore the design process, use of research and imagery, techniques of design communication, materials and associated tools for the realization of designs on the stage.

365 Advanced Scene Design and Technology

Spring. 4 credits; may be repeated for credit. Prerequisite: Theatre Arts 364 and permission of the instructor.

M W 12:20–2:15. R. Archer and V. Becker.

An exploration of scene design and technology on a more advanced level with particular stress upon project work and occasional production assignments.

366 Costume Design and Technology Fall.

4 credits. For both majors and qualified nonmajors in related fields. Prerequisite: Theatre Arts 250 or permission of the instructor.

T R 10:10–12:05. S. Perkins and staff.

An introduction to costume design and technology which includes: the analysis of the play and its characters, the use of period research as a source of style and construction techniques, and the application of materials, tools, and techniques to the process by which literary characters are given visual dramatic form on the stage.

367 Advanced Costume Design and Technology

Spring. 4 credits. Prerequisite: Theatre Arts 366 and permission of the instructor. May be repeated for credit.

T R 10:10–12:05. S. Perkins and staff.

An exploration of costume design and technology on a more advanced level with particular stress upon project work and occasional production assignment.

550 Theatre Design Studio I Fall and spring. 1–6 credits. Prerequisite: permission of the instructor. May be repeated for credit.

W F 10:10–12:05. V. Becker and staff.

Lecture and studio work in the principles of production design for graduate students and advanced undergraduates with professional-level interest. Focuses upon the development of personal design processes for the profession.

560 Theatre Design Techniques Studio I Fall and spring. 1–4 credits; may be repeated for credit.

Prerequisite: permission of the instructor.

M T W R 12:20–2:15. Staff.

Advanced studio work in the language of design: the representation of environments for the stage in both two- and three-dimensional form. Will include selected topics in drafting, painting, perspective, color theory, et cetera.

562 Lighting Techniques I Fall and spring.

4 credits; may be repeated for credit. Prerequisite: permission of the instructor.

M 9–12; W 9–10. R. Dressler and staff.

Lecture and studio work in the principles of lighting for graduate students and advanced undergraduates with professional-level interest. Focuses upon professional practices and standards.

564 Scenic Techniques I Fall and spring.

4 credits; may be repeated for credit. Prerequisite: permission of the instructor.

M 9–12; W 9–10.

Lecture and studio work in the principles of scenery for graduate students and advanced undergraduates with professional-level interest. Focuses upon development of a personal design process for the profession.

566 Costume Techniques I Fall and spring.

4 credits. Prerequisites: permission of the instructor. May be repeated for credit.

M 9–12; W 9–10. S. Perkins, M. Dixey.

Lecture and studio work in principles of costumes for the stage. For graduate students and advanced undergraduates with professional-level interest. Will focus upon the relationship of design to the skills by which designs are visualized and realized on the stage.

650 Theatre Design Studio II Fall and spring.

1–6 credits; may be repeated for credit. Prerequisite: permission of the instructor.

W F 10:10–12:05. V. Becker and staff.

Theatre Design and Technology Laboratories**151 Production Laboratory I** Fall and spring.

1–2 credits; may be repeated for credit.

Orientation meeting in Willard Straight Theatre at

7:30 p.m. on the second day of classes. Staff.

Instruction and practice on the introductory level to the basic techniques of construction and operation of scenery, costumes, lighting and/or sound. Instruction is supervised by the design-technology faculty and is directed towards the actual production of plays for the Theatre Cornell production season.

251 Production Laboratory II Fall and spring.

1–3 credits. May be repeated for credit. Prerequisite: Theatre Arts 151 or permission of the instructor.

Orientation meeting in Willard Straight Theatre at

7:30 p.m. on the second day of classes. Staff.

Practical production experience which involves specialized instruction and specific responsibilities in positions such as light board operator, wardrobe mistress, set or properties crew head, assistant stage manager, et cetera, as well as preparatory work in specific areas of more advanced construction in scenery, costumes, lighting, sound and/or management. Instruction and practice is supervised by the design-technology faculty and is directed toward the actual production of plays for the Theatre Cornell production season.

351 Production Laboratory III Fall and spring.

1–3 credits. May be repeated for credit. Prerequisite: Theatre Arts 251 or permission of the instructor.

Orientation meeting in Willard Straight Theatre at

7:30 p.m. on the second day of classes. Staff.

Practical production experience which offers an opportunity for advanced positions in design, technology, and/or stage management. These include full responsibility for an aspect of a smaller production, major responsibilities as an assistant on a major production, or significant responsibilities as stage manager, major crew head, or similar position. All work is guided and supervised by appropriate faculty and is an active part of the Theatre Cornell production season.

451 Production Laboratory IV Fall and spring.

1–4 credits. May be repeated for credit. Prerequisite: Theatre Arts 351 or permission of the instructor.

Orientation meeting in Willard Straight Theatre at

7:30 p.m. on the second day of classes. Staff.

Practical production experience requiring full design, technical, or management responsibility of an aspect of a produced play within the Theatre Cornell production season. Student designer, technician, or stage manager will be assigned an appropriate faculty adviser to supervise the process.

551 Production Laboratory V Fall and spring.

1–4 credits; may be repeated for credit. Prerequisite: permission of the instructor.

Hours to be arranged. Staff.

Production design, technical, or management responsibilities for graduate students and advanced undergraduates with professional-level interest. Student will be assigned an appropriate faculty adviser.

Playwriting**348 Playwriting** Fall and spring. 4 credits.

Prerequisite: permission of instructor.

T 2–4:25. P. Vogel.

A laboratory for the discussion of student plays. Each student is expected to write two or three one-act plays, or one full-length play.

349 Advanced Playwriting Spring. 4 credits. May be repeated for credit.

T 2–4:25. P. Vogel.

A continuation of Theatre Arts 348.

Theatre History, Literature, and Theory**240 Introduction to the Theatre** Fall or spring. 3 credits.

M W F 11:15. J. Haarstick.

A survey of the elements of drama and theatre intended to develop appreciation and rational enjoyment of the theatre in all its forms. Not a production course.

300 Independent Study Fall or spring.

1–4 credits; no more than 4 credits each semester. May be repeated for credit. Limited to upperclass students. Prerequisite: permission of the department

staff member directing the study.

Staff.

Individual study of special topics.

325 Classic and Renaissance Drama (also Comparative Literature 352) Fall. 4 credits.

T R 12:20–1:25. W. Cohen.

Readings in world drama from the Greeks to Shakespeare, including dramatists such as Aeschylus, Sophocles, Euripides, Aristophanes, Plautus, Seneca, Calderon, Kyd, Marlowe, Shakespeare, Jonson, and Webster, with emphasis on the Greek and Elizabethan periods.

326 European Drama, 1660 to 1900 (also Comparative Literature 353) Spring. 4 credits.

T R 10:10–11:25. S. Williams.
Readings from major dramatists from Molière to Ibsen, including such authors as Racine, Congreve, Sheridan, Schiller, Goethe, Hugo, Büchner, Gogol, Turgenyev, Zola, Hauptmann, and Chekhov.

327 Modern Drama (also Comparative Literature 354) Fall. 4 credits.

M W F 1:25. A. Caputi.
Readings from major dramatists of the twentieth century, including Ibsen, Chekhov, Strindberg, Shaw, Pirandello, Ionesco, Brecht, Beckett, and Pinter.

333 History of the Theatre I Spring. 4 credits.

M W F 11:15. S. Williams.
A survey of the characteristics of primitive theatre and of theatrical styles and production modes in Classical Greece and Rome, medieval Europe, Renaissance England, France, Italy, and Spain.

[334 History of the Theatre II] Spring. 4 credits. Not offered 1981–82.

A survey of theatrical styles and production modes from 1660 to 1914. Among the periods considered are the English Restoration, the eighteenth and nineteenth centuries in England, France and Germany, and the international modernist theatre. The course will conclude with a brief survey of the Oriental Theatre, with particular reference to its influence on European symbolism.]

335 History of the Theatre III Fall. 4 credits.

T R 10:10–11:25. S. Williams.
A survey of the modern and contemporary theatre, from expressionism to the present day. Particular emphasis will be placed on the experimental aspects of the modern theatre, on the work of key innovators such as Appia, Craig, Brecht, Piscator, Brook and Grotowski, and on contemporary, experimental theatre groups.

336 American Drama and Theatre Spring. 4 credits.

T R 12:20–1:35. Staff.
A study of the American theatre and representative American plays with emphasis on drama from O'Neill to the present.

372 English Drama (also English 372) Spring. 4 credits.

M W F 10:10. S. McMillin.
Important events in the English theatre from the beginning to the twentieth century. Plays by Marlowe, Shakespeare, Jonson, Webster, Dryden, Wycherly, Behn, Congreve, Sheridan, Shelley, Shaw, and others. Relationships between play houses, dramatic texts, and politics.

424 Dramaturgy: Play and Period Spring. 4 credits. Prerequisites: permission of instructor, and some upper-level work in literary analysis or theatre history.

T R 2:30–3:45. Staff.
An intensive study of the theatrical and cultural background of a play being performed in the department's mainstage season. The course will include a detailed study of the play itself, of the other works of the dramatist and, where relevant, of other plays of the time. Students will be expected to complete a dramaturgical assignment.

434 Theatre and Society Fall. 4 credits. Prerequisite: permission of the instructor. Students will be expected to have had some upper-level experience in one of the following areas: literary

analysis, theatre history, sociology, psychology, history, anthropology, or philosophy.

T R 2:30–3:45. Staff.
An examination of the role theatre has played in the social and political life of Western civilization. Topics to be covered will include: the theatre and the church, the theatre as an agent of social change, censorship and the theatre, the theatre and revolution, and theatre and education. Students will be encouraged to use this examination to arrive at their own definitions of the importance of the mimetic instinct in human society.

436 Theory of the Theatre and Drama Fall. 4 credits. Prerequisite: permission of the instructor.

M W F 2:30–4:25. P. Vogel.
A study of various theories of dramatic form and theatrical presentation from Aristotle and Horace to Artaud and Brecht, with emphasis on the romantic and modern period, including Lessing, Hugo, Wagner, Strindberg, Stanislavsky, Appia, Craig, Yeats, Langer, Frye, Burke, Fergusson, and Grotowski.

[442 Ibsen and Chekhov (also Comparative Literature 472)] Not offered 1981–82.]

495 Honors Research Tutorial Fall or spring. 1–4 credits. Prerequisites: senior standing and departmental acceptance as an honors candidate. 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. Staff.

Preparation and presentation of honors thesis or practicum.

632 Critical Writing Workshop Spring. 4 credits. Staff.

633 Seminar in Theatre History Fall. 4 credits. T 2:30–4:30. S. Williams.

Subject: American and European theatre 1918–39.

[636 Seminar in Dramatic Criticism] 4 credits. Not offered 1981–82.]

[637 Seminar in Dramatic Theory] 4 credits. Not offered 1981–82.]

[638 Seminar in Theory of the Theatre] Not offered 1981–82.]

672 Tragedy: Philosophy and Theory (also English 672) Spring. 4 credits. T. Murray.

[699 Seminar in the Theories of Directing] Not offered 1981–82.]

700 Introduction to Research and Bibliography in Theatre Arts Fall. 1 credit. Enrollment restricted to students in 633.

T 2:30–4:30. S. Williams.
A study of methods and materials relevant to the solution of problems in theatre arts, including introduction to standard research sources, problems of translation, and preparation of theses and publications.

880 Master's Thesis

990 Doctoral Thesis and Special Problems

Related Courses in Other Departments

Greek Mythology (Classics 236)

[Myths of Greece and Rome (Classics 150)] Not offered 1981–82.]

The Greek Experience (Classics 211)

The Roman Experience (Classics 212)

Comedy (Comparative Literature 312)

Japanese Noh Theatre (Comparative Literature 400 and Asian Studies 400)

Shakespeare (English 227)

Introduction to Drama (English 272)

Shakespeare (English 327)

Seminar in Shakespeare (English 427)

Schiller (German Literature 354)

Russian Theatre and Drama (Russian 332)

Dance

See description of Theatre Laboratories for information concerning credit for participation in dance productions.

200 Introduction to Dance I Fall. 3 credits. Prerequisite: registration only through department roster in 302 Helen Newman Hall. Concurrent enrollment in a dance technique class at the appropriate level is required.

T R 12:20–1:50. P. Lawler.
Movement improvisation and composition, readings in dance aesthetics and twentieth-century dance history. Film and video tapes are used.

201 Introduction to Dance II Spring. 3 credits. Prerequisite: Theatre Arts 200 or permission of the instructor.

T R 12:20–1:50. Staff.
Continuation of Theatre Arts 200.

[205 Contemporary Composers and Choreographers] 3 credits. Not offered 1981–82.]

210 Beginning Dance Composition and Music Resources (also Physical Education 210) Fall. 4 credits. Prerequisites: Theatre Arts 201, intermediate technique level, and/or permission of instructor. Registration only through department roster in 302 Helen Newman Hall. Prerequisites for dance majors only: Music 141. Concurrent enrollment in a technique class at the appropriate level is required.

M W 6:30–8. one additional meeting to be arranged. D. Borden and J. Gregg.
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 (also Physical Education 211) Spring. 4 credits. Prerequisite: Theatre Arts 210. M W 6:30–8. Staff. Continuation of Theatre Arts 210.

304 Intermediate Ballet Technique (also Physical Education 134) Fall or spring. 1 credit; may be repeated for up to 4 credits. Prerequisite: Physical Education 131 and/or permission of the instructor. M W F 2:30–4. P. Saul.
Study and practice of traditional training exercises and the classical ballet vocabulary; work is done on strengthening the body and using it as an expressive instrument.

306 Intermediate Modern Dance Technique (also Physical Education 136) Fall or spring. 1 credit; may be repeated for up to 4 credits. Prerequisite: Physical Education 136 and/or permission of the instructor.

M W F 4:40–6:10. J. Gregg.

Study and practice of training exercises and an expressive contemporary movement 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 12:20–1:50. M. Bethé.
Section 1: Indian Dance. Not offered 1981–82.
Section 2: Japanese Noh Theatre. The M W classes will teach the dance techniques used in noh. Students will learn to perform short pieces from several plays. The Friday class will discuss the noh theatre in more general terms, dealing with the plays, music, costumes, and props, as well as dance. Students will read noh plays and articles about noh, and will view films and video tapes. There will be short papers and exams. The M W classes may be taken without the F class, in which case physical education credit may be earned, but not academic credit. Students who attend all three classes and do all work may earn both physical education credit and 3 units of academic credit.

308 High Intermediate Modern Dance Technique (also Physical Education 138) Fall or spring. 1 credit; may be repeated for up to 4 credits.

Prerequisite: Theatre Arts 306 and/or permission of the instructor.

T R 4:40–6:10. J. Gregg.
Continuation of Theatre Arts 306.

310 Advanced Dance Composition (also Physical Education 310) Fall. 4 credits. Prerequisite: Theatre Arts 211 and/or permission of the instructor.

Hours to be arranged. Staff.
Problems in composition for groups and music resources for dancers.

311 Advanced Dance Composition (also Physical Education 311) Spring. 4 credits. Prerequisite: Theatre Arts 310 and/or permission of the instructor.

Staff.
Further problems in composition for groups.

[312 Physical Analysis of Movement] 3 credits. Not offered 1981–82.]

[314 History of Dance] 3 credits. Not offered 1981–82.]

[315 History of Dance] 3 credits. Not offered 1981–82.]

[316 Human Biology for the Performing Arts] 5 credits. Not offered 1981–82.]

[318 Historical Dances] 2 credits. Not offered 1981–82.]

410 Individual Problems in Composition (also Physical Education 410) Fall or spring. 3 credits. Prerequisite: Theatre Arts 311 and/or permission of the 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 the instructor.
Hours to be arranged. Staff.
Topic for 1981–82 to be announced.

Cinema

[374 Introduction to Film Analysis: Meaning and Value] 4 credits. Not offered 1981–82; next offered 1982–83.

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 experimental film types.]

[375 History and Theory of the Commercial Narrative Cinema] 4 credits. Fee for screening expenses, \$5 (this fee is paid in class). Not offered 1981–82; next offered 1982–83.

T R 2–4:25. D. Fredericksen.
Within the context of history, the description, interpretation, and evaluation of commercial narrative films as works of art and as objects for mass consumption. Emphases include "the articulation of a cinematic language," "realism," "popular art," and "modernism." Contemporary methods of analysis such as the auteur theory and semiotics are introduced.]

376 History and Theory of Documentary and Experimental Film Fall. 4 credits. Fee for screening expenses, \$5 (this fee is paid in class).

T R 2–4:25. D. Fredericksen.
Documentary figures covered include Vertov, Flaherty, Grierson, Ivens, Lorentz, Riefenstahl, Capra, and Jennings. Within the history of experimental film, emphases are the avant-garde of the twenties, the movement toward documentary in the thirties, and American experimental film from the forties to the present.

377 Fundamentals of 16-mm Filmmaking Fall or spring. 4 credits. Limited to 12 students each semester. Prerequisite: permission of instructor. Fee for maintenance costs, \$10 (this fee is paid in class). The average cost to each student for materials and processing is \$150.

T R 2–4:25. M. Rivchin.
The mechanics and expressive potential of 16-mm filmmaking, including nonsynchronous sound. Each student makes two short films, and retains ownership of them. 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. Fee for screening expenses, \$5 (this fee is paid in class). Not offered 1981–82; next offered 1982–83.

T R 2–4:25. D. Fredericksen.
An intensive treatment of two distinct periods of innovation in film history and theory. Emphasis is on the relationship between theory and practice. Major figures include Eisenstein, Pudovkin, Vertov, Dovzhenko, Godard, Truffaut, Resnais, Robbe-Grillet, Bresson, and Rivette.]

379 International Documentary Film from 1945 to the Present Spring. 4 credits. Prerequisite: Theatre Arts 376. Fee for screening expenses, \$5 (this fee is paid in class).

D. Fredericksen.
Emphases on the contemporary international documentary as a sociopolitical "force," as an ethnographic tool within and without a filmmaker's own culture, and as an artistic form with a distinct history and set of "theoretical" questions. Major figures, structures, and movements covered include Jennings, Rouquier, Leacock, Malle, Rouch, Solanas, national film boards, "Challenge for Change," "direct cinema," "cinema vérité," and revolutionary documentary from the Third World.

475 Seminar in the Cinema I Fall. 4 credits.

T R 10:10–11:30. D. Fredericksen.
Topic for fall 1981: C. G. Jung and film analysis. Consideration of the three nodes of Jung's psychology (the typing of psychological attitudes and functions; the structure and dynamics of the psyche; and the character and functions of archetypal imagery) and of their relevance to film analysis and theory.

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, \$10 (this fee is paid in class). The average cost to each student for materials and processing is \$150; students retain ownership of their films.

W 2–4:25. M. Rivchin.

The development and completion of individual projects, with emphasis on personal and documentary modes, including preparation of an original script or storyboard; direction cinematography; synchronous-sound recording; editing; and follow-through to a composite print.

Related Courses in Other Departments

Postwar Italy: The Film as a Cultural, Artistic, and Political Reflector (Italian 399 and Comparative Literature 306)

Inter-University Center for Critical and Film Studies in Paris

Cornell is part of a consortium supporting the center. For course listings and information about participation, contact Professor Fredericksen, 112 Lincoln Hall. Prerequisites for participation in the program are fluency in French and completion of Theatre Arts 374, 375, and 376.

Special Programs and Interdisciplinary Studies

Africana Studies and Research Center

J. Turner, director; W. Cross, director of undergraduate studies, 310 Triphammer Road, 256–4625. O. Agyeman, Y. ben-Jochannan, R. Harris, M. Marable, 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 African and African-American Studies) through the University's Graduate School.

The purpose of the program is to prepare students for professional careers relevant to the learning and leadership needs of the African-American community. It envisions that the knowledge and methodology of various fields and disciplines will be brought to bear upon the history, present state, and dynamics of the black people and cultures in the Americas, Africa, and the Caribbean. The curriculum is designed to reflect a multidisciplinary approach to the experience of African peoples throughout the world. Africana Center courses are open to both majors and nonmajors.

The Africana Major

The undergraduate major offers interdisciplinary study of the fundamental dimensions of the Afro-American and African experiences. Because of the comprehensive nature of the program, it is to the students' advantage to declare themselves Africana majors as early as possible. The following are prerequisites for admission to the major. Students should submit:

- 1) a statement of why they want to be an Africana studies major;
- 2) a tentative outline of the area of study they are considering (African or Afro-American) for the undergraduate concentration; and
- 3) a full transcript of courses taken and grades received.

The center's undergraduate faculty representative will review the applications and notify students within two weeks of the status of their request.

After acceptance as a major in the Africana Center, a student must maintain a C+ cumulative average in the center's courses while completing the major program. The Africana major must complete 36 credits in courses offered by the center, to include the following four core courses: AS&RC 231, 290, 360, 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 that 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 proposal before May 1 of the student's junior year. The completed thesis or project report 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, 360, 361, 370, 381, 405, 460, 475, 483, 490.

Humanities: AS&RC 219, 422, 431, 432, 465, 492.

Expressive Arts: AS&RC 137, 138, 285, 303, 465.

Freshman Seminars: AS&RC 137, 138, 171, 172, 203, 204, 231, 290.

Note: Students who are not AS&RC majors may petition to satisfy a second requirement with center courses if they are carrying a heavy program at the center.

Language Requirement

Swahili fulfills the College of Arts and Sciences language requirement. Successful completion of AS&RC 131, 132, 133, and 134 provides qualification in Swahili. Successful completion of AS&RC 202 gives proficiency in Swahili. Africana majors are not required to take Swahili, but the center recommends the study of Swahili to complete the language requirement.

131 Swahili Fall. 4 credits. No prerequisites.
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.
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.
Hours to be arranged.

A writing skills course which 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 problems of public schools in black communities.

190 Introduction to Modern African Political Systems Fall. 4 credits.
M W 1:25–2:15. O. Agyeman.
The course directs attention to the salient characteristics of Africa's political systems and assesses the way the systematic characteristics impinge on developmental efforts. It is particularly concerned with the responses of the systems of the legacy of colonially-imposed constitutions, the efforts at post-colonial constitutional engineering, and at the creation of integrative institutions in answer to the problem of multiethnic fragmentation, the place of traditionalism in the modern political context, the locus of power in the systems, and the level of institutionalizations reached, if any, to ensure stable continuity into the future.

202 Swahili Literature Fall. 4 credits. Prerequisite: Swahili 134. Offered on demand.
A. Nanji.
Students gain mastery over spoken Swahili and are introduced to the predominant Swahili literary forms.

203 History and Politics of Racism and Segregation Fall. 4 credits.
T R 12:20–1:25. C. Mbata.
A cross-cultural study in historical context of the evolution of racist thought and practice in southern Africa and North America.

204 History and Politics of Racism and Segregation Spring. 4 credits.
T R 12:20–1:25. C. Mbata.
The patterns of racism and segregation are dealt with in a historical context, using southern Africa and

North America as case histories. Study is undertaken within a theoretical framework that broadly defines racism and segregation and their implications.

[219 Issues in Black Literature] Fall. 4 credits. Not offered 1981–82. 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. M. Marable.

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 responses to real conditions of oppression and exploitation.

[283 Black Resistance: South Africa and North America] Fall. 4 credits. Not offered 1981–82.
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. Not offered 1981–82.
M W 1:25.

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. Prerequisites: permission of instructor.
W 10:10. W. Cross.

Existing research is used to raise specific questions about new cultural political awareness in the black community. The focus is on individual conversion experiences within the context of social movements. The transformations of political groups (for example, Black Panther Party) and outstanding activists and intellectuals (such as Malcolm X) are used as reference points for analytical discussion of theory.

[302 Social and Psychological Effects of Colonization and Racism] Spring. 4 credits. Staff. Offered alternate years. Not offered 1981–82.]

[303 Blacks in Communication Media and Film Workshop] Spring. 3 credits. Not offered 1981–82. The focus is on the general theory of communications, the function of media in an industrialized society, and the social, racial, and class values implied in the communication process. There are group writing projects, a term paper, and the screening of significant American and Third World films.]

344 Neocolonialism and Government in Africa (The Politics of Public Administration) Fall. 4 credits.
T R 1:25–2:15. O. Agyeman.

The course is designed to explain why Africa's public administrations in the post-colonial 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. W. Collins.

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 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.

351 Politics in the Afro-Caribbean World; An Introduction Fall or spring according to demand. 4 credits. A study of the social, political, economic, and psychological forces that have shaped Caribbean societies.

352 Pan-Africanism and Contemporary Black Ideologies Spring. 4 credits. 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 and fifty years.

381 Contemporary African History Spring. 3 credits. M W 12:20–1:25.

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 to 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. M. Marable. 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. O. Agyeman.

The course explores the processes of the historical underdevelopment of Africa, drawing upon the assumptions of the "underdevelopment" theory. It then takes up the problems of development by examining the different ideologies and strategies extant and by highlighting the interaction of political and economic forces. Case studies are drawn from Ghana, Kenya, and Tanzania.

405 Political History of the Age of Booker T. Washington and W. E. B. DuBois. Spring. 4 credits.

T R F 1:25–2:15. M. Marable. 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 social 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.

422 African Literature Spring. 4 credits. Not offered 1981–82.

The main focus is on the basic themes in the twentieth-century literature produced by Africans south to the Sahara.

[425 Advanced Seminar in Black Theatre] Fall. 4 credits. Not offered 1981–82. The course involves the study and production of the total black theatre.]

431 History of Afro-American Literature Fall. 4 credits.

An extensive examination of the impact that Afro-American literature has had on describing, explaining, and projecting the Afro-American experience from 1619 to present.

432 Modern Afro-American Literature Spring. 4 credits.

A study of fiction by black writers, focusing on the political and sociological component that influenced the development and growth of black writing in relationship to literary themes and attitudes current in specific periods and movements from post-World War I to the present.

460 History of African Origins of Major Western Religions Fall or spring. 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.

[465 Black Critique: Towards Defining and Developing a Black Aesthetic] Spring. 4 credits. Not offered 1981–82.

A study of aesthetic, moral, and cultural values and judgments that black people can develop, recognize, and viably respect as black aesthetics.]

475 Black Leaders and Movements in Afro-American History Spring. 4 credits. T R 3:35–4:25. R. Harris.

A comprehensive analysis of the personalities, ideas, and activities central to the struggle for Afro-American liberation, ranging from eighteenth-century figures to the present time. Rebellion, emigration, assimilation, nationalism, accommodation, protest, cultural pluralism, separation, integration, and revolution are some of the central issues.

[483 Themes in African History] Fall. 4 credits. Not offered 1981–82.

M W 1:25–3:20. C. Mbata. 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 Southern Africa Spring. 4 credits. M W 3–4:25. O. Agyeman.

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 governmental decision makers and the corporate structure is developed.

490 Advanced Reading and Research Seminar in Black History Spring. 4 credits. 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.

Note: May be taken to fulfill requirements for a major in African or Afro-American studies.

495 Political Economy of Black America Spring. 4 credits. F 12:20–2:15. M. Marable.

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.

498-99 Independent Study 498, fall; 499, spring.

Hours to be arranged. Africana Center faculty.
For students working on special topics with selected readings, 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. O. Agyeman.
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 A. G. Frank, Walter Rodney, and others. It then takes up the problems of development by an examination of 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: AS&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. R. Harris.
Through a critical examination of the approach, methodology, and philosophy of major writers in this field such as James W. C. Pennington, George Washington Williams, W. E. B. DuBois, Carter G. Woodson, John Hope Franklin, Benjamin Quarles, Lerone Bennett, Jr., and Vincent Harding, the evolution of Afro-American history is traced from its origin to the present. The nature and purpose of Afro-American history, especially the role of the black historian in the context of a racist and oppressive society, is analyzed. Attention is given to sources for studying black history, and each participant fashions a conceptual framework for application to the materials and evidence of the black experience in America.

[515 Comparative Political History of the African Diaspora] 4 credits. Prerequisites: upperclass or graduate standing, or two of the following courses: AS&RC 203, 204, 283, 360, 361, 475, 484, 490. Offered alternate years. Not offered 1981-82.]

[520 Historical Method, Sources and Interpretation]

Fall. 4 credits. Prerequisites: upperclass or graduate standing, or two of the following courses: AS&RC 203, 204, 361, 475, 484, 490.
C. Mbata.
Offered alternate years. Not offered 1981-82.]

[550 Transnational Corporations in Africa and Other Developing Countries]

Spring. 4 credits. Prerequisites: upperclass or graduate standing, or permission of instructor. Not offered 1981-82.
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]

4 credits. Offered according to demand. Prerequisite: upperclass or graduate standing or permission of instructor. Not offered 1981-82.]

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 black self-concept; (6) the relationships among identity, behavior, and ideology.

698-699 Thesis 698, fall; 699, spring. Limited to Africana Studies and Research Center students.
Africana Center faculty.

Biology and Society

Prof. Davydd J. Greenwood, director, 632 Clark Hall, 256-3810. Biology and society is a multidisciplinary program for students with special interests in such problems as genetic engineering, environmental quality, food and population, the right to medical care, and the relation between biology, society, and ethics and/or public policy, as well as for students who plan postgraduate study in management, health, medicine, law, or other related fields.

The Major

Because the biology and society major is multidisciplinary, students must attain a basic understanding of each of the several disciplines it comprises, including introductory courses in the fields of biochemistry, chemistry, mathematics, genetics, ecology, ethics, and history. In addition, majors are required to take the two-semester course in biology and society, a set of electives, and a special senior seminar. Programs incorporating these required courses are designed in consultation with a special group of faculty advisers to accommodate each student's individual goals and interests. For further information on the major, including courses of related interest, specific course requirements, and application procedures, contact Professor Davydd J. Greenwood, Program on Science, Technology, and Society, 632 Clark Hall.

301 Biology and Society I: The Biocultural Perspective (also Anthropology 301 and Biological Sciences 301) Fall. 3 credits (4-credit option by arrangement with instructor). Prerequisite: one year of biology.

M W F 9:05. D. Greenwood and S. Risch.
Viewing human biology, behavior, and institutions as the ongoing products of the interactions between human biological evolution and cultural change. This course documents these interactions with reference to the following topics: language, meaning, and cultural "realities"; and major models of human nature and human institutions.

302 Biology and Society II: Biology, Society, and Human Values (also Anthropology 302 and Biological Sciences 302) Spring. 3 credits (4-credit option by arrangement with instructor). Prerequisite: Anthropology, Biological Sciences, or Biology and Society 301.

M W F 9:05. S. Risch and D. Greenwood.
This course takes up the complex intellectual, practical, and ethical issues centering on the relationships between biological and social phenomena. Specific current issues such as pollution, genetic counseling, recombinant DNA research, and others will be taken up and an effort will be made to develop a viable biocultural ethic for dealing with such problems.

400 Toward An Ecological Agriculture: Prospects and Limitations (Biology and Society Senior Seminar) Spring. 1-3 credits. Primarily for juniors and seniors. Prerequisite: at least one biological science and one social science course.

Hours to be arranged. S. Risch.

This course will explore biological-technical and sociopolitical constraints to the emergence of a more ecologically sustainable agriculture in the United States and other nations. Each session will begin with a brief introduction or overview by the course coordinators or others doing research on various aspects of ecological agriculture. The remainder of each session will consist of class discussion related to assigned readings.

401 Problems in the History of Biology (Biology and Society Senior Seminar) (also History 385)

Fall. 4 credits. No prerequisites.

T 2:30-4:25. W. B. Provine.
Mechanisms, design, and ethics in relation to the development of modern biology.

402 Problems in the History of Biology (Biology and Society Senior Seminar) (also History 386)

Spring. 4 credits. Prerequisite: elementary knowledge of evolutionary biology and genetics.

T 2:30-4:25. W. B. Provine.
The evolutionary synthesis: an examination of the grand synthesis of evolutionary Biology in the 1930s and 40s, including its origins and present status.

403 Population Policy (Biology and Society Senior Seminar)

Fall. 4 credits.

W 3:35-5:30. J. M. Stycos.
The ways in which societies try to affect demographic trends. Special focus is on government policies and programs to influence fertility.

[400 Human Fertility in Developing Nations (Biology and Society Senior Seminar)] Not offered fall 1981.]

[401 Biomedical Research, Regulations, and Ethics: A Delicate Balance (Biology and Society Senior Seminar)] Not offered fall 1981.]

[402 Biomedical Research, Regulations, and Ethics: A Delicate Balance (Biology and Society Senior Seminar)] Not offered spring 1982.]

[403 Social Demography (Biology and Society Senior Seminar)] Not offered spring 1982.]

China-Japan Program

T. J. Pempel, director; S. Cochran, associate director; R. Barker, M. Barnett, M. G. Bernal, K. Biggerstaff, N. C. Bodman, K. Brazell, B. deBary, A. G. Grapard, E. M. Gunn, E. H. Jorden, V. Koschmann, L. C. Lee, J. McCoy, T. L. Mei, D. P. Mozingo, D. E. Perushek, C. A. Peterson, C. Ross, P. S. Sangren, H. Shadick, 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 and 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, contact the director or any staff member in the China-Japan Program Office, 140 Uris Hall.

Center for International Studies

See Independent Interdisciplinary Centers and Programs, p. 289.

College Scholar Program

Dean Lynne Abel, director, 159 Goldwin Smith Hall, 256-3386.

The College Scholar Program is described in the introductory section, p. 00.

College Scholar 397 Independent Study Fall or spring. 1-4 credits. Prerequisite: permission of program office.

College Scholar 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.

College Scholar Seminars Inquire in 159 Goldwin Smith Hall.

Independent Major Program

The Independent Major Program is described in the introductory section, p. 87.

Independent Major 351 Independent Study Fall or spring. 1-4 credits. Prerequisite: permission of program office.

Independent Major 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.

Program of Jewish Studies

D. I. Owen, director (Near Eastern and ancient Jewish history and archaeology); J. Cohen, coordinator, and director of undergraduate studies (Jewish history, church and the Jews, rabbinics). 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), A. G. Korman (Holocaust studies, Jewish labor movements), C. Kronfeld (Hebrew and Yiddish language and literature), A. S. Lieberman (physical geography and natural history of Israel), E. Rosenberg (Jews in modern European and Anglo-American literature), M. A. Zober (community development and social policies in Israel).

The Program of Jewish Studies is included in the framework 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 Tannaic literatures, medieval Hebrew literature, modern Jewish thought, modern Hebrew literature, and ancient, medieval, and modern Jewish history. In some of these fields students may take courses both on graduate and undergraduate levels. Faculty in other departments provide additional breadth to the program by offering courses in related areas of study.

[101 Jewish Contributions to Western Culture Fall. 3 credits. Not offered 1981-82.]

Related Courses

Near Eastern Studies

Courses offered 1981-82.

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 (Near Eastern Studies 222)

Jews of the Ancient and Muslim Near East: 450 B.C.E.-1204 C.E. (Near Eastern Studies 244)

Undergraduate Seminar in Biblical Literature: Prophecy in Ancient Israel (Near Eastern Studies 322)

Evolution of Jewish Law (Near Eastern Studies 341)

The History and Culture of Ancient Mesopotamia (Near Eastern Studies 363)

Jewish Workers in Europe and America, 1789-1948 (I&LR 381)

Courses that are not offered 1981-82.

Freshman Seminar in Biblical Literature: Heroes and Heroines of the Bible (Near Eastern Studies 125)

Tradition and the Literary Imagination (Near Eastern Studies 291)

Readings in Classical Hebrew Literature (Near Eastern Studies 221)

The History of Ancient Israel to 450 B.C.E. (Near Eastern Studies 243)

The Emergence of the Modern Jew: 476-1948 (Near Eastern Studies 245)

Seminar in Modern Hebrew Literature: The Short Story (Near Eastern Studies 303)

Seminar in Modern Hebrew Literature: The Novel (Near Eastern Studies 304)

Folklore in the Ancient Near East (Near Eastern Studies 336)

The Jewish Community Throughout History (Near Eastern Studies 343)

Age of the Patriarchs (Near Eastern Studies 344)

Judaism and Christianity in Conflict (Near Eastern Studies 347)

History of the Ancient Near East in Biblical Times (Near Eastern Studies 365)

Tolerance and Intolerance: The Image of the Jew in Western Civilization (Comparative Literature 320)

Literature of the Holocaust (Comparative Literature 323)

Yiddish Literature in Translation (German Literature 350)

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)

The Jewish Problem as Political Problem (Government 371)

Latin American Studies

Donald Solá, director, S. Barraclough, T. Davis, B. Edmonston, D. Freebairn, P. Garrett, R. Goldsen, W. Goldsmith, C. Greenhouse, J. Haas, D. Hazen, J. Henderson, T. Holloway, B. J. Isbell, J. Kahl, E. Kenworthy, T. Lynch, R. McDowell, O. Mitchell, C. Morris, J. Murra, T. Poleman, B. Rosen, D. Sanjur, E. M. Santí, J. M. Stycos, M. Süner, H. D. Thurston, J. Tittler, A. Van Wambeke, W. Whyte, L. Williams, F. Young

The Latin American Studies Program encourages and coordinates faculty and student interests in Latin America. A variety of special lectures, films, and seminars supplement the regular course offerings. Undergraduate students may arrange a Latin American concentration or an independent major in Latin American studies, and graduate students may pursue a minor in Latin American studies while majoring in the graduate field of their choice. The College of Arts and Sciences offers Latin American studies courses in anthropology, economics, government, history and sociology. In addition, there is a varied language, literature, and linguistics curriculum in Spanish, Portuguese, and Quechua. The student may also pursue Latin American Studies in the College of Agriculture and Life Sciences; the College of Architecture, Art, and Planning; the College of Human Ecology; and the School of Industrial and Labor Relations.

Latin American Studies Course Offerings

Economics of Agricultural Development (Agricultural Economics 464)

Seminar on Latin American Agricultural Policy (Agricultural Economics 665)

Production of Tropical Crops (Agronomy and Crop Science 314)

Geography and Appraisal of Soils of the Tropics (Agronomy 401)

Management Systems for Tropical Soils (Agronomy 480)

Livestock Production in Warm Climates (Animal Science 400)

Forages of the Tropics for Livestock Production (Animal Science 403)

Discovery of America (Anthropology 150)

[Earliest Civilizations (Anthropology 250) Not offered 1981-82.]

Urban Anthropology (Anthropology 313)

Ethnology of the Andean Region (Anthropology 333)

[Interpretation of the Archaeological Record (Anthropology 352) Not offered 1981-82.]

Archeology of the Americas I (Anthropology 354)

Archeology of the Americas II (Anthropology 355)

[Field Archeology in South America (Anthropology 361 and Archeology 361) Not offered 1981-82.]

Ethnohistory (Anthropology 418)

[Indians of Mexico and Central America (Anthropology 432) Not offered 1981-82.]

Andean Thought and Culture (Anthropology 433)

**Investigation of Andean Institutions:
Archaeological Strategies (Anthropology 435)**

**[Mesoamerican Thought and Culture
(Anthropology 456) Not offered 1981–82.]**

**Seminar in Archaeology: Central America
(Anthropology 494)**

Andean Symbolism (Anthropology 632)

Andean Research (Anthropology 633)

**Problems in Archaeology: Agricultural Origins
(Anthropology 663)**

**[Problems in Archaeology: Early Man in America
(Anthropology 664) Not offered 1981–82.]**

**[Origins of Mesoamerican Civilization
(Anthropology 667) Not offered 1981–82.]**

**Historical Archaeology: Method and Theory
(Archaeology 311)**

**Economic History of Latin America (Economics
325/525)**

**[Cuba: Culture and Revolution (Government 335)
Not offered 1981–82.]**

**[Latin American Politics (Government 340) Not
offered 1981–82.]**

**[Latin American Society and Politics (Government
665) Not offered 1981–82.]**

Colonial Latin America (History 295)

Latin America in the Modern Age (History 296)

**[Agrarian Societies in Latin American History
(History 347) Not offered 1981–82.]**

**Twentieth-Century Brazil (History 348 and
Sociology 368)**

**[Seminar in Latin American History (History 649)
Not offered 1981–82.]**

**Special Studies of Problems of Agriculture in the
Tropics (International Agriculture 602)**

**Plant Diseases in Tropical Agricultural
Development (Plant Pathology 655)**

Elementary Portuguese (Portuguese 121–122)

**Portuguese Intermediate Composition and
Conversation (Portuguese 203–204)**

**[Portuguese Advanced Composition and
Conversation (Portuguese 303–304) Not offered
1981–82.]**

**Readings in Luso-Brazilian Culture (Portuguese
305–306)**

**Seminar in Portuguese Linguistics (Portuguese
700)**

Quechua Elementary Course (Quechua 131–132)

Quechua Intermediate Course (Quechua 133–134)

Seminar in Quechua Linguistics (Quechua 700)

**Freshman Seminar: The Reader in Fiction
(Romance Studies 108)**

**Introduction to Hispanic Literature (Romance
Studies 201)**

**Advanced Spanish Composition (Romance
Studies 312)**

**Readings in Sixteenth- and Seventeenth-Century
Hispanic Literature (Romance Studies 315)**

**Readings in Spanish-American Literature
(Romance Studies 317)**

**Readings in Latin American Civilization (Romance
Studies 323)**

**The Modern Drama in Spanish America (Romance
Studies 331)**

**[Modern Drama in Spanish America (Romance
Studies 332) Not offered 1981–82.]**

**[The Spanish-American Short Story (Romance
Studies 333) Not offered 1981–82.]**

**The New Latin-American Narrative in Translation
(Romance Studies 335 and Comparative Literature
335)**

**[Popular Culture in Contemporary
Spanish-American Prose Fiction (Romance
Studies 336) Not offered 1981–82.]**

**Art and Politics in Latin America (Romance
Studies 394)**

**Modern Latin American Poetry in Translation
(Romance Studies 396 and Comparative Literature
396)**

**[Modern Hispanic Poetry (Romance Studies 398)
Not offered 1981–82.]**

**Special Topics in Hispanic Literature (Romance
Studies 419–420)**

**Honors Work in Hispanic Literature (Romance
Studies 429–430)**

**[Colonial Spanish-American Literature (Romance
Studies 479) Not offered 1981–82.]**

**[Hispanic Romanticism (Romance Studies 489)
Not offered 1981–82.]**

**[Resonances of the Quixote in the Modern
Hispanic Novel (Romance Studies 496) Not
offered 1981–82.]**

**Special Topics in Hispanic Literature (Romance
Studies 639–640)**

**[Carlos Fuentes (Romance Studies 689) Not
offered 1981–82.]**

**Seminar on the Contemporary Spanish-American
Novel (Romance Studies 696)**

Hispanic Americans (Sociology 265)

**Twentieth-Century Brazil (Sociology 368 and
History 348)**

**[Human Fertility in Developing Nations (Sociology
434) Not offered 1981–82.]**

Research Seminar in Population (Sociology 632)

Elementary Spanish (Spanish 121–122)

Continuing Spanish (Spanish 123)

**Spanish Intermediate Composition and
Conversation (Spanish 203–204)**

**Spanish Advanced Composition and Conversation
(Spanish 303)**

**Spanish Advanced Conversation and
Pronunciation (Spanish 312)**

**History of the Spanish Language (Spanish
401–402)**

Applied Linguistics: Spanish (Spanish 407)

**[The Grammatical Structure of Spanish (Spanish
408) Not offered 1981–82.]**

Hispanic Dialectology (Spanish 601)

**Linguistic Structure of Ibero-Romance (Spanish
602)**

**Contemporary Theories of Spanish Phonology
(Spanish 603)**

**Contemporary Theories of Spanish Grammar
(Spanish 604)**

Seminar in Spanish Linguistics (Spanish 700)

Law and Society

C. Greenhouse (anthropology); J. Bennett (philosophy); C. Carmichael (comparative literature); G. Hay (economics); C. Holmes (history); J. Jacobs (sociology); J. Rabkin (government); D. B. Lyons (philosophy); M. B. Norton (history); D. Powers (Near Eastern studies); D. T. Regan (psychology)

The Law and Society Program is an interdisciplinary concentration for undergraduates who are interested in the law from the perspectives of the social sciences and the humanities: anthropology, comparative literature, economics, government, history, philosophy, psychology, and sociology. Students who wish to graduate with a concentration in Law and Society should consult one of the advisers listed above to develop a coherent program of study, including at least four courses from the Law and Society list of courses.

Anthropology 328 Law and Culture

Anthropology 329 Politics and Culture

Anthropology 627 Law in the Context of Culture

Classics 304 Roman Law

Economics 352 Public Regulation of Business

**Government 313 The Nature, Functions, and
Limits of Law**

**Government 328 Constitutional Politics: The
United States Supreme Court**

Government 389 International Law

**History 275 Crime and Punishment: The
American Vision from the Puritans to Mickey
Spillane**

**History 318 American Constitutional
Development**

**History 359 The Early Development of
Anglo-American Law**

**History 430 Law and Authority in America:
Freedom, Restraint, and Judgment**

**Near Eastern Studies 341 Evolution of Jewish
Law**

**Near Eastern Studies 252 Islamic Law and
Society**

Philosophy 342 Law, Society and Morality

Philosophy 441 Contemporary Ethical Theory

Philosophy 444 Contemporary Legal Theory (also Law 632)**Sociology 348 Sociology of Law****Sociology 352 Prisons and Other Institutions of Coercion****Sociology 365 Criminology****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 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 either the Department of Mathematics, the Department of Computer Science, or some department of the College of Engineering.

Medieval Studies

A. B. Groos, director; B. B. Adams, F. M. Ahl, V. T. Bjarnar, R. G. Calkins, J. Cohen, A. M. Colby-Hall, R. T. Farrell, T. D. Hill, J. J. John, R. E. Kaske, N. Kretzmann, G. Mazzotta, G. M. Messing, C. Moron-Arroyo, J. M. Najemy, D. M. Randel, B. Tierney, F. van Coetsem

Undergraduates interested in medieval studies have an opportunity to take courses in the following areas of instruction: medieval Hebrew, Arabic, and Latin; Old English, Middle English, and medieval Irish and Welsh; Old Provençal and medieval French; medieval Spanish and Italian; Old Saxon, Old High German, Middle High German, Gothic, Old Norse (Old Icelandic), and Old Russian; comparative literature, medieval art and architecture, medieval history, Latin paleography, medieval philosophy, musicology, comparative Slavic linguistics, comparative Romance linguistics, and comparative Germanic linguistics. Undergraduates who wish to undertake an independent major or a concentration in medieval studies should consult the director of the program, Professor Groos, 180 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. (consult Freshman Seminar Program brochure).

102 King Arthur and His Knights Fall and spring. 3 credits.

Hours to be arranged. (consult Freshman Seminar Program brochure).

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 the Department of German Literature (185 Goldwin Smith Hall) as soon as the *Course and Time Roster* is published.

For further information about the courses offered or about the program for independent major in medieval studies, students should contact the program director, Professor A. B. Groos, 180 Goldwin Smith Hall.

Religious Studies

A. W. Wood, chairman; C. M. Arroyo, R. Baer, J. Bishop, J. Boon, R. Calkins, C. Carmichael, K. Clinton, J. Cohen, M. Colacurcio, M. Collins, A. Grapard, J. John, T. Kirsch, N. Kretzmann, S. O'Connor, D. Owen, D. Powers, D. Randel, C. Strout, B. Tierney

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 Wood, 327 Goldwin Smith Hall.

Courses in religious studies are offered in the Department of Anthropology, Archaeology, Asian Studies, Classics, Comparative Literature, English, History, History of Art, Natural Resources, Near Eastern Studies, Philosophy, and Romance Studies.

Russian and Soviet Studies Major

G. Staller, chairman; M. G. Clark, W. Galenson, and G. J. Staller, (economics); A. Senkevitch (architecture); M. Rush, (government); W. M. Pintner (history); U. Bronfenbrenner (psychology); P. Carden, C. Emerson, G. Gibian, N. Perlina, and S. Senderovich, and A. Zholkovsky, (Russian literature); L. H. Babby, E. W. Browne III, R. L. Leed, and A. Nakhimovsky (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 shall be selected in consultation with the student's adviser and shall be approved as appropriate for a major in Russian and Soviet studies.

Each student majoring in Russian and Soviet studies will be assigned a major adviser in the department of his or her special interest who is also a specialist on Russia.

Program on Science, Technology, and Society

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

The Program on Science, Technology, and Society (STS) is an academic unit that engages in teaching and research involving the interactions of science and technology with social and political institutions. In collaboration with other University departments and centers, the STS Program participates in the development of interdisciplinary courses at both the graduate and undergraduate level. These courses are designed to synthesize the perspectives of several academic disciplines in the analysis of relationships between science and technology on one hand, and today's society on the other. Current course and research topics include science, technology, and public policy; biology and society; technology assessment; arms control and national defense policies; energy policy; environmental policy and ethics; health and safety regulation; biomedical ethics; science policy; science and technology for development; scientific and technological literacy; 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; 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 in the 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 a minor field of biology and society is currently being considered. Studies in peace science can be pursued as a major concentration within the Field of Economics. Further information about these graduate programs may be obtained by contacting the Graduate School.

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).

Related courses in other departments

Biomedical Ethics (Biological Sciences 205 and Philosophy 245)

[The Politics of Technical Decisions (Graduate Seminar) (City and Regional Planning 541, Government 628, and Business and Public Administration NPA 515) Not offered 1981–82.]

Social Implications of Technology (Engineering C&EE B305)

Environmental Law (Engineering C&EE B615)

Urban Affairs Laboratory (Government 312)

Science, Technology, and Law (Law 796)

Technology and Social Change (Rural Sociology 424)

International Politics of Energy (Government 490)

History of Biology (History 287 and Biological Sciences 201)

Environmental Ethics (Biological Sciences 206 and Philosophy 246)

Science and Human Nature (Philosophy 286)

Technology, Society, and the Human Condition (Engineering, Mechanical and Aerospace Engineering 302)

Seminar in Technology Assessment (Engineering C&EE B416 and College Scholar 464)

The Impact of Control of Technological Change (City and Regional Planning 440, Economics 302, and Government 302)

Social and Political Studies of Science (Sociology 355 and City and Regional Planning 442)

Science, Technology, and Human Needs (DEA 232)

History of Biology (History 288 and Biological Sciences 205)

The Population Biology of Health and Disease (Veterinary Medicine 330)

[Politics of Technical Decisions II (City and Regional Planning 542, Government 629, and Business and Public Administration NPA 516) Instructor will notify students if course will be offered spring 1982.]

[The Computerized Society (Computer Science 305) Not offered fall 1981.]

[International Law (Government 389) Not offered fall 1981.]

[Sociology of Science and Technology (Sociology 255) Not offered fall 1981.]

[Science, Technology, and Public Policy (Business and Public Administration NPA 405 and Government 426) Not offered spring 1982.]

[Social History of Western Technology (History 380) Not offered spring 1982.]

Social Relations Major

Prof. Robin 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 apply to the Social Relations Committee, 323 Uris Hall. Candidates should have completed the following prerequisites: (a) either a course in sociology or Anthropology 201; (b) either Psychology 101 or 128 or Sociology 280; and (c) either Sociology 325 or Industrial and Labor Relations 210 or an equivalent course.

The Major

The major calls for a minimum of 35 credits of course work as follows:

- 1) Three pairs of 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 of sociology, advanced psychological statistics, philosophy of science or of social science, or advanced statistics (such as Industrial and Labor Relations 311);
- 3) At least one course in theory related to social relations; and
- 4) The senior seminar in social relations (Sociology 497 or Anthropology 495).

A list of the courses that may be used to satisfy the requirements for a major in social relations is available from any of the major advisers.

Society for the Humanities

(A. D. White Center for the Humanities)
Eric A. Blackall, director. Fellows for 1981–82: Moshe Barasch (The Hebrew University of Jerusalem), Sander L. Gilman (Cornell University), Donald K. Hedrick (Kansas State University), Robin F. Miller (Harvard University), Rudolf Wagner (Free University of Berlin), Geoffrey Waite (University of Iowa), Rainer Warning (University of Munich), Peter Williams (University of Edinburgh), Neal Zaslav (Cornell 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 center (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.

All seminars are held in the A. D. White Center for the Humanities, 27 East Avenue.

Frederick G. Marcham Scholar Program. Each year the Frederick G. Marcham Scholar Program supports a special seminar program. For information contact Anne-Marie Garcia, Society for the Humanities (256–4086).

101 Freshman Seminar: Science as Literature Fall and spring. 3 credits.

T R 10:10–11:25. 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 Freshman Seminar: Science as Literature Spring. 3 credits.

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, and Freud, we shall follow man's journey from a position of dominance in a geocentric, divinely ordered universe to that of a genetically programmed organism in a decaying biosystem. We shall examine how well, or how completely, he has accommodated his dreams to the new worlds born of science.

381–382 Law and Social Change in Early Modern England (The Frederick G. Marcham Seminar) 381, fall; 382, spring. 4 credits each term.

Fall: M W 2:30–3:45. Spring: irregular class meetings; students will pursue independent work in consultation with the instructors, and the class will meet for presentations by visiting scholars and members of the class. L. Bonfield and C. Holmes.
An exploration of the relationships between social and political development in England from the fifteenth through the eighteenth centuries, and the transformation of the substantive rules of law and the institutional structure for their administration. The class will examine some general theoretical statements concerning the social springs of legal change, then, in the light of these, will engage in a detailed examination of the English legal system in the early modern period, with particular reference to commercial, constitutional and property law.

413–414 Renaissance Spectating: Audience as Artifice 413, fall; 414, spring. 4 credits each term.

W 1:25–3:10. D. Hedrick.
A ranging study of the experience of audiences of the Renaissance arts. To selected works and specialties of seminar participants we will apply Renaissance and contemporary theory about audience strategies, including notions from psychology, language philosophy, and literary theory. Finding analogues among literary, nonliterary, and nonartistic conventions, with some emphasis on Elizabethan drama and the development of represented conversation, we will explore significant audience divisions: by class, gender, morality, and familiarity; audienceless art; audiences as participants.

415 The Gothic Novel Fall. 4 credits.

R 1:25–3:10. R. Miller.
The Gothic novel should not be dismissed as pulp fiction dealing solely with "unspeakable terrors" and "dark labyrinths." Students will examine in these novels the merging of comic realism with fantasy, of the genuinely tragic with the sentimental, of the horrid with the beautiful. We shall consider the textual and the historical reasons for the immense popular success of these novels, which were literally "read to pieces."

416 The Confession: Rhetoric and Morality Spring. 4 credits.

R 1:25–3:10. R. Miller.
Many writers (such as Diderot, Gogol, and Dostoevsky), recognizing the problematic nature of the confession, have made use of it to exploit and portray textual and moral paradoxes. Others (such as St. Augustine, Montaigne, Rousseau, and Tolstoy), who understood the double-edged nature of this

genre, still undertook to find genuine expression within it. We shall study literary confessions (both fictional and autobiographical) from the standpoint of the audience—whether that audience is actual, fictive, or composed to some aspect of the author's own being.

417 The Role of Literature as Presented in Post-1949 Chinese Writing Fall. 4 credits.

M 3:35–5:20. R. Wagner.
The seminar will study highly acclaimed and highly controversial short stories of the period 1956–58 and the period since 1976 (Wang Meng, Liu Binyan, and others) to look for the self-assessment of literature and its role embodied in the stories. The literary material will be subjected to a political analysis extracting on a conceptual level what is embodied concretely in characters and plot. Given the highly politicized structure of the literary field the educational, political, and behavioral patterns embodied in the story will be confronted with explicit political statements by the leadership.

418 Cog or Scout: Functional Concepts of Socialist Literature Spring. 4 credits.

M 3:35–5:20. R. Wagner.
Two different functional concepts of literature in socialist states of the Leninist type (China, Soviet Union, and GDR) will be studied. Both the theoretical writings and actual texts (mostly in translation) will be examined with the purpose of extracting a general (non-comparative structural) assumption about the mechanisms which lead to the fluctuations between 'liberal' and 'dogmatic' attitudes of the leadership vis-a-vis literature. The traditional 'orthodoxy vs. dissidents' paradigm will be reconsidered.

419 Conventions of Expression in Renaissance Art Fall. 4 credits.

W 3:35–5:20. M. Barasch.
A discussion of the formal conventions and motifs employed in depicting character and emotion. Particular attention will be given to postures, gestures, and physiognomic types. The interaction of rhetorics, poetics, and the theory of the visual arts with workshop practices in appealing to the beholder. The adjustment of the means of expression to the different types and levels of audience.

420 Nineteenth-Century French Realism and Modern Discourse Theory Spring. 4 credits.

W 3:35–5:20. R. Warning.
The course will deal mainly with Stendhal. The theoretical basis proposed will be the relevant approaches of Foucault, Lotman, and Bakhtin. Bakhtin's concentration on the dialogic principle in fiction will be used to relate the work in this seminar to the announced focal theme of the Society.

421–422 The Reception of the Idea of the Woman in the Late Nineteenth Century 421, fall; 422, spring. 4 credits each term.

T 3:35–5:20. S. Gilman.
The course will survey the reception of the idea of the "female" in nineteenth-century philosophy (Schopenhauer, Nietzsche, Andreas-Salome); opera (Wagner, Bizet, Strauss); literature (Flaubert, Fontane, Wilde, Ibsen); art (Klimt, Klinger); medicine (Krafft-Ebing, Lombroso, Freud); physical anthropology and biology (Blumenbach, Darwin, Haeckel); and sociology (Engels, Weber). Central to the course will be the reception of these thinkers and creative artists by the public of their times. The focus will be on the contemporary reception of these works in Germany, England, France, and the United States. Reading knowledge of French or German would be helpful, but is not essential.

423 Music in Society in Western Europe in the Second Half of the Eighteenth Century Fall. 4 credits.

T 1:25–3:10. N. Zaslaw.
Close reading of dozens of eighteenth-century texts in order to understand the nature of private and public music making two centuries ago and the

writers' attitudes toward the music. Open to upperclassmen and graduate students with a good reading knowledge of at least one western European language.

424 The Symphonies of Mozart Spring. 4 credits.

T 1:25–3:10. N. Zaslaw.
An investigation of source problems, problems of authenticity, style analysis, performance practice, and audience reception of the more-than-sixty symphonies attributed to Mozart. Open to undergraduates who have completed Music 352, to graduate students in music, and to others with permission of the instructor.

425–426 Nietzsche: Aspects of His Reception

425, fall; 426, spring. 4 credits each term. Reading knowledge of German or French would be helpful but is not essential.

R 3:35–5:20. G. Waite.
Selected published and unpublished texts drawn from different periods of Nietzsche's writing will be examined carefully and treated from the general perspective of current reception theories. We shall study specific, representative ways that Nietzsche has been received by a number of often radically conflicting ideologies and methodologies, including the following: political theory on the Right and on the Left (Baumeister and the Nazis; Glucksmann and New Philosophy; Western Marxism of Lukács and of the Frankfurt School; recent Soviet analysis); Existentialism (Jaspers and Camus); Analytic Philosophy (Danto); Christian theology and the problem of nihilism (Küng); Hermeneutics (Heidegger; Ricoeur); Individual Psychology (Adler); Post-Structuralism (Derrida); literary criticism and Deconstruction (de Man); and Nietzsche and literature (Thomas Mann). In addition, the seminar will advance a theory of Nietzsche's rhetoric and ideology in the attempt to understand critically his writing and the complex history of its reception.

428 The Interpretation of J. S. Bach's Keyboard Music Spring. 4 credits.

M 1:25–3:10. P. Williams.
Though such a theme suggests (for players and non-players alike) a technical and advanced approach to a unique corpus of music, in studying it seminar-members would find many broader issues involved: the nature of performance in general, the limits of notation, the purpose of music, its relationship to instruments of the period, the composer's beliefs, the character of orthodox Lutheranism, and the need for both player and historian to rid his ideas of anachronism.

433–434 Guided Reading Fall and spring. 2 credits each term.

435–436 Guided Research Fall and spring. 4 credits each term.

South Asia Program

G. B. Kelley, director; R. D. Colle, A. T. Dotson, E. C. Erickson, J. W. Gair, M. D. Glock, D. Holmberg, M. Katzenstein, F. Kayastha, K. A. R. Kennedy, G. B. Kelley, R. D. MacDougall, K. March, G. W. Messing, S. J. O'Connor, T. T. Poleman, N. Uphoff

The South Asia Program exists to encourage and correlate teaching and research in South Asian studies dealing with Bangladesh, India, Nepal, Pakistan, and Sri Lanka (Ceylon). The program faculty includes members from a number of disciplines. Undergraduates with a special interest in South Asia may major in Asian studies with a concentration in South Asia. Languages regularly offered are Hindi, Sinhalese, Tamil, Telugu and Urdu. Cornell is a charter member of the American Institute of Indian Studies (AIIS) and undergraduates, as well as graduate students, are eligible for AIIS three-month summer or nine-month intensive language programs in India. For courses available in South Asia and details on the major, see the

Department of Asian Studies listing in this volume. Students wishing further information should see the director, South Asia Program, 130 Uris Hall.

Southeast Asian Program

S. J. O'Connor, director; B. R. Anderson, R. Barker, M. L. Barnett, J. A. Boon, E. W. Coward, A. B. Griswold, M. Hatch, F. E. Huffman, R. B. Jones, G. McT. Kahin, A. T. Kirsch, 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. Fifteen 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, Cambodian, Cebuano (Bisayan), Indonesian, Javanese, Tagalog, Thai, and Vietnamese. Intensive instruction is offered in the Full-Year Asian Language Concentration (FALCOLN) 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 in America on this part of the world.

Undergraduates may major in Asian Studies with a focus on Southeast Asia and its languages, or they may elect to take a concentration in Southeast Asia Studies by completing 15 credits of course work. Students interested in exploring these opportunities should consult the Director, Southeast Asia Program, 120 Uris Hall.

Women's Studies Program

S. Bem, director; D. Bem, F. Berger, J. Blackall, R. Boyd, L. Brown, J. Brumberg, S. Buck-Morss, I. Ezergailis, J. Farley, J. Fortune, J. Gerner, D. Holmberg, B. J. Isbell, M. Jacobus, M. Katzenstein, B. Koslowski, S. McConnell-Ginet, K. March, M. B. Norton, E. Regan, M. Rivchin, S. Siegel, J. Sweeney, L. Waugh

Staff and community members: L. Abel, Z. Eisenstein, L. Lavine, J. T. McHugh, J. Ormondroyd, R. Siegel, C. Williams, C. York
Student members: G. Birnbaum, E. Emling, N. Glazener, L. McElroy, E. Polakoff, V. Skinner, C. Widmer

Women's Studies, a University program in the College of Arts and Sciences, has three goals: to encourage the development of teaching about women and sex roles for women and men; to examine assumptions about women in various disciplines and to develop, systematize, and integrate back into the disciplines new knowledge about women; and to cooperate in public service activities with the extension division of the University.

The program is guided by a board composed of faculty and students at Cornell and members of the Cornell and Ithaca communities who have an intellectual interest in women's studies. Program facilities in Uris Hall including reading room, informal lounge, and seminar room are open to all interested students and faculty.

Program Offerings

Undergraduate students in the College of Arts and Sciences wishing to major in women's studies can design their own major through the College Scholar or Independent Major Programs. Any graduate student in the University may elect a women's studies

minor. Students interested in either major or minor should obtain further information from the Women's Studies office, 332 Uris Hall.

The program typically sponsors a biweekly noncredit seminar for students and faculty to facilitate sharing of knowledge across disciplinary lines. During the academic year the program also sponsors frequent public lectures dealing with social, political, and intellectual issues in women's studies.

Distribution Requirements

Distribution requirements are satisfied by any two Women's Studies courses in any of the following categories:

Social Sciences: 238, 244, 277, 321, 353, 422, 671, 685, plus past courses with approval.
History: 238, 326, 363, 426, 626, 627, plus past courses with approval.
Humanities: 248, 249, 399, 451, 478, 479, 483, plus past courses with approval.

Courses

Keeping in mind that women's studies is interdisciplinary, it is useful to distinguish six core areas of 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

103 Writing as Women (also English 104) Fall and spring. 3 credits.

M W F 12:20. Staff.

Students explore their experience as girls and women through introspective, autobiographical writing. In seminars and individual conferences we stress development of a clear, individual writing style. Students critique each other's papers and discuss a variety of writing—short fiction, essays, poetry, journals, interviews—from a wide selection of 20th century women writers, including Adrienne Rich, Virginia Woolf, Toni Morrison, Tillie Olsen, and Maxine Hong Kingston, among others.

[104 Women and Social Transitions in the Twentieth Century (also Asian Studies 101)] Spring. 3 credits.

B. deBary. Not offered 1981–82.]

[105 Feminine and Masculine Ideals in Japanese Culture (also Asian Studies 105)] Fall. 3 credits.

K. Brazell. Not offered 1981–82.]

[107 The Family in American History (also History 107)] Spring. 3 credits. M. B. Norton. Not offered 1981–82.]

II. General Courses

214 The Biological Basis of Sex Differences (also Biological Sciences 214) Spring. 3 credits.
Prerequisite: one year of introductory biology.
M W F 9:05. J. E. Fortune.

The structural and functional differences between the sexes are examined. Emphasis is placed on mechanisms of mammalian reproduction and special attention is given to human studies, where possible. 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.

[244 Language and the Sexes (also Linguistics 244)] Spring. 4 credits. Prerequisites: Linguistics 101, 111, Psychology 215 or permission of instructor. S. McConnell-Ginet. Not offered 1981–82.]

249 Feminist Issues in Nineteenth- and Twentieth-Century Literature (also English 248) Spring. 4 credits.

M W F 1:25. M. Jacobus.

An introductory course in writing by and about women, exploring the relation between women, literature, and feminism. There will be five main areas of concern: work and home; education and marriage; sexuality; motherhood; and the women artist or writer herself. Readings will include novels by Charlotte Brontë, Charles Dickens, George Eliot, Thomas Hardy, Virginia Woolf, Sylvia Plath, Margaret Atwood, and Adrienne Rich, as well as a variety of texts drawn from writers on women and feminism from Mary Wollstonecraft to the present day.

277 Psychology of Sex Roles (also Psychology 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 child rearing, female sexuality, homosexuality, and transsexualism.

321 The Anthropology of Women and Gender (also Anthropology 321) Fall. 4 credits.

M W F 2:30. K. March and D. Holmberg.

An introduction to the study of sex roles cross-culturally and to anthropological theories of sex and gender. The course examines various aspects of the place of the sexes in social, political, economic, ideological, and biological systems to emphasize the diversity in gender and sex role definition around the world.

[326 Women in American Society, Past and Present (also History 326)] Spring. 4 credits.

M. B. Norton. Not offered 1981–82.]

[353 Women and Politics (also Government 353)] Spring. 4 credits. M. Katzenstein. Not offered 1981–82.]

III. Specialized Courses and Seminars

238 The Historical Development of Women as Professionals, 1800–1980 (also Sociology 238 and HDFS 258) Fall. 3 credits. Students in endowed units must register for Women's Studies or Sociology 238.

T R 2:30–4. J. Brumberg.

The historical evolution of the female professions in America (midwifery, nursing, teaching, librarianship, prostitution, home economics and social work) as well as women's struggles to gain access to

medicine, law, the clergy, the academy. Lectures, reading and discussion are geared to identifying the cultural patterns which fostered the conception of gender-specific work and the particular historical circumstances which created these different work opportunities. The evolution of "professionalism" and the consequences of professionalism for women, family structure, and American society is 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 influence on contemporary readers. Readings for 1981 are: Austen, *Persuasion*; C. Brontë, *Jane Eyre*; E. Brontë, *Wuthering Heights*; Gaskell, *Mary Barton*; Stowe, *Uncle Tom's Cabin*; Eliot, *The Mill on the Floss*; Gilman, "The Yellow Wallpaper"; Chopin, *The Awakening*; Wharton, *Ethan Frome*; and a twentieth-century imaginative sequel to *Jane Eyre*, Jean Rhys's *Wide Sargasso Sea*.

[363 Women in Classical Greece and Rome (also Classics 363)] Spring. 4 credits. L. Abel. Not offered 1981–82.]

399 The Divided Self in Women's Writing (also Comparative Literature 399) Fall. 4 credits.

T R 10:10–11:25. I. Ezerгалis.

A thematic and structural investigation of women's writing to explore the tension between the highly developed self-awareness of narrator and/or heroine and the desire for wholeness. We will trace some of the ways in which women writers have tried to resolve or transcend this problem of identity by retreat, acceptance, or new synthesis. The list of authors includes Virginia Woolf, Doris Lessing, and Sylvia Plath as well as translations of contemporary German women novelists.

422 Special Problems in the Anthropology of Women and Gender (also Anthropology 422) Fall. 4 credits. Prerequisite: Women's Studies 321 (Anthropology 321) or permission of instructor.

R 2:30–4:25. D. Holmberg.

Each year this seminar focuses upon a particular area of concern within the anthropology of women, building upon the work done in Women's Studies and Anthropology 321. The topic for 1981 is the position and meaning of women in practices associated with witchcraft, shamanism, spirit possession, and curing. The approach is comparative and considers these beliefs and practices ethnographically and historically in Western and non-Western societies.

426 Undergraduate Seminar in Early American History (also History 426) Fall. 4 credits.

Prerequisite: permission of instructor. Preference will be given to students who have completed Women's Studies 326 (History 326), Women's Studies 238 (Sociology 238 and HDFS 258), or Women's Studies 438.

T 2:30–4:25. M. B. Norton.

Topic for 1981: Women in early America.

451 Twentieth-Century Women Writers (also English 451 and 651) Spring. 4 credits.

W 2:30–4:25. B. Rosecrance.

A consideration of selected fiction by British women writers from the turn of the century to the present day, including writers of English, Irish, Australian, Canadian, and South African origin. Critical study of stories and novels will emphasize evolutions in the craft and artistic consciousness of women writers in this period. We will draw upon works of such writers as Sarah Grand, Olive Schreiner, Ada Leverson, Dorothy Richardson, Virginia Woolf, Katherine Mansfield, Elizabeth Bowen, Jean Rhys, Barbara Pym, Rebecca West, Christina Stead, Iris Murdoch,

Doris Lessing, Nadine Gordimer, Margaret Atwood, Margaret Drabble, Antonia (Drabble) Byatt, and Susan Hill. The emphasis will be on lesser-known novelists within the earlier period and on both well- and lesser-known contemporary writers.

478 Women and Writing (also English 478) Fall. 4 credits.

M W F 11:15. M. Jacobus.

The course will focus on works by and about women, clustering in four main areas: Romanticism and after (Mary Wollstonecraft, Mary Shelley, Emily Brontë), Victorians (Charlotte Brontë, Tennyson, Elizabeth Barrett Browning), the New Woman Fiction of the 1890s (Hardy, Olive Schreiner, Ibsen), and Modernists (Gertrude Stein, Katherine Mansfield, Virginia Woolf). The aim will be twofold: first, to consider questions about women's writing (the existence of a female literary tradition, the specificity of women's writing, the conditions under which they wrote) and the representation of women and women's issues in prose and poetry; and second, to complement an examination of the sexual and political ideology reproduced in literature with readings from important feminist documents and with current theoretical work (in England, America, and France) toward developing a specifically feminist critique.

479 On Reading Women Poets (also English 479) Spring. 4 credits.

T R 12:20. S. Siegel.

An examination of the traditional controversy over whether or not reading, writing, and gender are related to one another. Detailed study of the autobiographical, critical, and poetic writings of Amy Lowell, Hilda Doolittle, Marianne Moore, Sylvia Plath, and Adrienne Rich. The seminar will consider salient departures from conventional poetic modes and themes and the pressures each poet has felt to be significant in her attempt to shape herself, her aesthetic, and her poetry. Discussion will begin with a specific question which will recur throughout the semester: How would Virginia Woolf have read these poets?

[483 Feminism and French Literature (also French 483)] Fall. 4 credits. N. Furman. Not offered 1981-82.]

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 (also History 626)] Fall. 4 credits. M. B. Norton. Not offered 1981-82.]

627 Graduate Seminar in the History of American Women (also History 627) Spring. 4 credits. M 2:30-4:25. M. B. Norton.

[671 Toward a Feminist Social Theory (also Government 670)] Spring. 4 credits. S. Buck-Morss. Not offered 1981-82.]

685 Seminar in Sex Differences and Sex Roles (also Psychology and Sociology 685) Fall. 4 credits. Prerequisite: permission of instructor. Hours to be arranged. S. Bem.

796 Women and the Law (also Law 796) Spring. 3 credits. Prerequisite: permission of instructor. Hours to be arranged. Staff.

IV. Related Courses and Seminars

305 Psychological Anthropology (also Anthropology 305) Fall. 4 credits.

M W F 11:15. B. J. Isbell.

A consideration of problems selected to illustrate the mutual relevance of psychology and anthropology,

concentrating on cross-cultural studies of cognitive and social development, with an emphasis on comparisons of socialization of sex roles.

357 American Families in Historical Perspective (also Sociology and HDFS 359) Spring. 3 credits. Prerequisite: HDFS 150 or one 200-level social science or history course. Students in endowed units must register for Women's Studies 357 or Sociology 359.

T R 2:30-4. J. Brumberg.

An introduction 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.

456 Edith Wharton, Willa Cather, and Eudora Welty (also English 456) Spring. 4 credits.

Hours to be arranged. J. Blackall.

A representative selection of the best fiction of three distinguished American women writers with particular regard to their practice of the craft of fiction and their achievements as regionalist writers. Reading prospectively to include Wharton, *The House of Mirth*, *Ethan Frome*, "The Bunner Sisters," and *The Age of Innocence*; Cather, *My Antonia*, *A Lost Lady*, *The Professor's House*, and *Death Comes for the Archbishop*; Welty, *The Robber Bridegroom*, *The Optimist's Daughter*, and selected short stories. A discussion course, with several short papers and a longer essay.

463 The Repressed Feminine in the Writings of Marx (also Government 466) Fall. 4 credits.

T R 12:20-1:35. S. Buck-Morss.

467 Current Topics in Political Philosophy (also Government 467) Fall. 4 credits.

W 2:30-4. D. Meyers.

This course explores the philosophical dimensions of current political issues. Topics vary but could include equal opportunity, capital punishment, free speech, and the like. Emphasis is placed on careful analysis of issues and methods of normative justification. The topics for 1981 are equal opportunity and civil disobedience. In considering equal opportunity, we will study alternative approaches to justice, the wrong of discrimination, the idea of social responsibility, the justifiability of different programs aiming to compensate for past discrimination. In exploring the problem of civil disobedience, we will ask what is the basis of political authority, why we are obligated to obey the law, what is the difference between civil disobedience and rebellion, and how civil disobedience can be justified.

[759 Virginia Woolf (also English 759)] Spring. 5 credits. Prerequisite: permission of instructor. S. Siegel. Not offered 1981-82.]

Related Courses offered in Other Departments

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.

Human Sexuality: A Psychosocial Perspective (Human Development and Family Studies 315) Fall and spring. 3 credits each term. Staff.

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) Fall. 3 credits. P. Moen.

The Reception of the Idea of Woman in the Late Nineteenth Century (Society for the Humanities 420-422) Fall and spring. 4 credits each term. S. Gilman.

Faculty Roster

Abrams, Meyer H., Ph.D., Harvard U. Class of 1916
Professor of English, English
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
Aldrich, Howard E., Ph.D., U. of Michigan. Prof., Industrial and Labor Relations/Sociology
Allison, Paul, Ph.D., U. of Wisconsin. Assoc. Prof., Sociology
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. Emerson Hinchliff Professor of Spanish Literature, Romance Studies
Ascher, Robert, Ph.D., U. of California at Los Angeles. Prof., Anthropology
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Austin, William W., Ph.D., Harvard U. Goldwin Smith Professor of Musicology, Music
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Bahti, Timothy H., Ph.D., Yale U. Asst. Prof., Comparative Literature
Baird, Barbara, Ph.D., Cornell U. Asst. Prof., Chemistry
Baugh, Daniel A., Ph.D., Cambridge U. Assoc. Prof., History
Becker, Victor A., M.F.A., Brandeis U. Asst. Prof., Theatre Arts
Beckwith, Steven V. W., Ph.D., California Inst. of Technology. Asst. Prof., Astronomy/CSRP
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Bem, Sandra L., Ph.D., U. of Michigan. Prof., Psychology/Women's Studies
Bennett, John G., Ph.D., U. of Michigan. Asst. Prof., Philosophy
Béreaud, Jacques, Doctorat d'Univ., U. of Lille. Prof., Romance Studies
Berkelman, Karl, Ph.D., Cornell U. Prof., Physics/LNS
Bernal, Martin G., Ph.D., Cambridge U. Assoc. Prof., Government
Bernstein, Alvin H., Ph.D., Cornell U. Assoc. Prof., History
Berstein, Israel, Candidate in Physico-Mathematical Sciences, Roumanian Academy. Prof., Mathematics
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. 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

- Boon, James A., Ph.D., U. of Chicago. Assoc. Prof., Anthropology
- Bowers, John S., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Modern Languages and Linguistics
- Boyd, Richard N., Ph.D., Massachusetts Inst. of Technology. Prof., Philosophy
- Boykin, A. Wade, Ph.D., U. of Michigan. Assoc. Prof., Psychology
- 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
- Brewer, Daniel, Ph.D., Johns Hopkins U. Asst. Prof., Romance Studies
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- Brown, Laura, Ph.D., U. of California at Berkeley. Asst. Prof., English
- Brown, Lawrence D., Ph.D., Cornell U. Prof., Mathematics
- Brown, Stuart M., Jr., Ph.D., Cornell U. Prof. Emeritus, Philosophy/STS
- Brown, Theodore M., Ph.D., U. of Utrecht. Prof., History of Art
- Browne, E. Wayles, III, Ph.D., U. of Zagreb. 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. Asst. Prof., Government
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- Burlitch, James M., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Chemistry
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- Calkins, Robert G., Ph.D., Harvard U. Prof., History of Art
- Caputi, Anthony F., Ph.D., Cornell U. Prof., English
- Carden, Patricia J., Ph.D., Columbia U. Prof., Russian Literature
- Carmichael, Calum M., B.Litt., Oxford U. Prof., Comparative Literature/Biblical Studies
- Carpenter, Barry K., Ph.D., U. of London. Assoc. Prof., Chemistry
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- Chase, Stephen U., Ph.D., U. of Chicago. Prof., Mathematics
- Chester, Geoffrey V., Ph.D., Kings Coll., London. Prof., Physics/LASSP
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- Clark, M. Gardner, Ph.D., Harvard U. Prof., Industrial and Labor Relations/Economics
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- Cochran, Sherman G., Ph.D., Yale U. Assoc. Prof., History
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- 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, Stephen R., B.A., U. of Iowa. Assoc. Prof., Theatre Arts
- Coleman, John E., Ph.D., U. of Cincinnati. Assoc. Prof., Classics
- Collins, Marilyn F., Ph.D., Yale U. Asst. Prof., Near Eastern Studies
- Cooke, W. Donald, Ph.D., U. of Pennsylvania. Prof., Chemistry
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- Hildebrand, George H., Ph.D., Cornell U. Maxwell M.
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- Hubbard, John H., Doctorate D'État, U. de Paris.
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- Huffman, Franklin E., Ph.D., Cornell U. Prof., Modern
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- Hull, Isabel V., Ph.D., Yale U. Asst. Prof., History
- Husa, Karel, Diploma, Conservatory in Paris. Kappa
Alpha Professor of Music, Music
- Hwang, Jiunn, Ph.D., Purdue U. Asst. Prof.,
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- Irwin, Terence H., Ph.D., Princeton U. Assoc. Prof.,
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- Isard, Walter, Ph.D., Harvard U. Prof., Economics
- Isbell, Billie J., Ph.D., U. of Illinois. Assoc. Prof.,
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- Kahl, Joseph A., Ph.D., Harvard U. Prof., Sociology
- Kahn, Alfred E., Ph.D., Yale U. Robert Julius Thorne
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- Kaske, Carol V., Ph.D., Johns Hopkins U. Asst. Prof.,
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- Kenworthy, Eldon G., Ph.D., Yale U. Assoc. Prof.,
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- Kesten, Harry, Ph.D., Cornell U. Prof., Mathematics
- Kiefer, Nicholas M., Ph.D., Princeton U. Assoc. Prof.,
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- King, Ronald F., Ph.D., U. of Chicago. Asst. Prof.,
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- Kronik, John W., Ph.D., U. of Wisconsin. Prof.,
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- Krumhansl, James A., Ph.D., Cornell U. Horace White
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- LaCapra, Dominick C., Ph.D., Harvard U. Prof.,
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- Lambert, William W., Ph.D., Harvard U. Prof.,
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- 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
- Lee, David M., Ph.D., Yale U. Prof., Physics/LASSP
- Leed, Richard L., Ph.D., Cornell U. Prof., Modern
Languages and Linguistics
- Leeds, Patricia G., Ph.D., U. of Wisconsin. Asst. Prof.,
Government
- 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. 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/STS
- 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. Asst. Prof.,
English
- McClelland, Peter D., Ph.D., Harvard U. Assoc. 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., Linguistics
(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
- 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
- Mack, Ronald D., Ph.D., Columbia U. Assoc. Prof.,
Psychology
- Mahr, Herbert, Ph.D., U. of Erlangen. Prof.,
Physics/LASSP
- Majumdar, Mukal K., Ph.D., U. of California at
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- 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
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Assoc. Prof., Economics
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- Meltzer, Leo, Ph.D., U. of Michigan. Assoc. Prof.,
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Classics/Linguistics (Modern Languages and
Linguistics)
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Philosophy
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Assoc. Prof., English
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- Morris, Edward P., Ph.D., Yale U. Prof., Romance
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- Murra, John V., Ph.D., U. of Chicago. Prof.,
Anthropology
- Murray, Edward, Ph.D., Yale U. Asst. Prof., Music
- Murray, Timothy, Ph.D., Johns Hopkins U. Asst. Prof.,
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- Neisser, Ulric, Ph.D., Harvard U. Susan Linn Sage Professor of Psychology, Psychology
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- Newhall, Herbert F., Ph.D., Cornell U. Prof. Emeritus, Physics
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- Novarr, David, Ph.D., Yale U. Prof., English
- Nutting, Peter W., Ph.D., U. of California at Berkeley. Asst. Prof., German Literature
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- Payne, Lawrence E., Ph.D., Iowa State U. Prof., Mathematics
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- Usher, David A., Ph.D., Cambridge U. Assoc. Prof., Chemistry
- Usner, Daniel H., Jr., Ph.D., Duke U. Asst. Prof., History
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- Vernon, Kathleen M., Ph.D., U. of Chicago. Asst. Prof., Romance Studies
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- Wan, Henry Y., Jr., Ph.D., Massachusetts Inst. of Technology. Prof., Economics
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- Weick, Karl E., Ph.D., Ohio State U. Prof., Psychology
- Weiss, John H., Ph.D., Harvard U. Asst. Prof., History
- West, James E., Ph.D., Louisiana State U. Prof., Mathematics
- White, D. Hywel, Ph.D., Birmingham U. Prof., Physics/LNS
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- Wiesenfeld, John R., Ph.D., Case Inst. of Technology. Assoc. 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
- Williams, Simon, Ph.D., U. of East Anglia. Asst. Prof., Theatre Arts
- Wilson, Kenneth G., Ph.D., California Inst. of Technology. James A. Weeks Professor in Physical Sciences, Physics/LNS
- 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. Goldwin
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Wood, Allen W., Ph.D., Yale U. Prof., Philosophy
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Yano, Makoto, Ph.D., U. of Rochester. Asst. Prof.,
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Yennie, Donald R., Ph.D., Columbia U. Prof.,
Physics/LNS
Young, Martie W., Ph.D., Harvard U. Prof., History
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Zaslaw, Neal A., Ph.D., Columbia U. Assoc. Prof.,
Music
Zholkovsky, Alexander K., Cand. Phil., Moscow U.
Prof., Russian Literature

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 a basic requirement 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*.

Facilities

The Division of Biological Sciences is composed of six major sections: Biochemistry, Molecular and Cell Biology; Genetics and Development; Ecology and Systematics; Neurobiology and Behavior; Physiology; Plant Biology; and two smaller units, the L. H. Bailey Hortorium and the Shoals Marine Laboratory.

The offices, research laboratories, and classrooms of biology faculty members are located in many different buildings both on and off the campus, but most are in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Veterinary Medicine.

The division's Office for Academic Affairs and the Behrman Biology Center are centrally located in Stimson Hall to provide academic advice, counseling, and information to 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 a small 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

R. Barker, director; H. T. Stinson, associate director; K. K. Adler, M. Alexander, W. J. Aron, J. P. Barlow, D. M. Bates, A. Bensadoun, E. N. Bergman, K. W. Beyenbach, A. W. Blackler, S. E. Bloom, A. C. Borror, E. B. Brothers, W. L. Brown, P. J. Bruns, P. F. Brussard, W. R. Butler, T. J. Cade, J. M. Calvo, J. M. Camhi, R. B. Campenot, R. R. Capranica, B. F. Chabot, J. L. Cisne, R. K. Clayton, R. A. Corradino, W. B. Currie, P. J. Davies, E. A. Delwiche, W. C. Dilger, W. L. Dills, A. Dobson, W. J. Dress, S. J. Edelstein, T. Eisner, S. T. Emlen, H. E. Evans, P. P. Feeny, G. W. Feigenson, J. M. Fessenden-Raden, G. R. Fink, R. H. Foote, J. E. Fortune, T. D. Fox, E. L. Gasteiger, J. Gibson, Q. H. Gibson, J. H. Gillespie, C. A. S. Hall, B. P. Halpern, G. G. Hammes, W. Hansel, R. M. Harris-Warrick, G. Hausfater, L. A. Heppel, G. P. Hess, P. C. Hinkle, 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. A. R. Kennedy, J. M. Kingsbury, T. A. LaRue, F. W. Lengemann, A. C. Leopold, S. A. Levin, G. E. Likens, J. T. Lis, E. R. Loew, R. E. MacDonald, R. J. MacIntyre, J. T. Madison, P. L. Marks,

R. E. McCarty, W. N. McFarland, J. K. Moffat, K. J. Niklas, J. D. Novak, D. J. Paolillo, P. J. Parker, M. V. Parthasarathy, D. Pimentel, T. R. Podleski, F. H. Pough, W. B. Provine, E. Racker, E. Adkins Regan, G.-Y. Rhee, M. E. Richmond, S. J. Risch, J. W. Roberts, R. B. Root, M. M. Salpeter, P. W. Sherman, R. M. Spanswick, A. M. Srb, A. A. Szalay, D. N. Tapper, J. F. Thompson, B.-K. Tye, C. H. Uhl, N. W. Uhl, P. J. VanDemark, A. van Tienhoven, V. M. Vogt, R. H. Wasserman, M. D. Whalen, D. B. Wilson, W. A. Wimsatt, R. Wu, S. A. Zahler, D. B. Zilversmit

Other Teaching Personnel

R. R. Alexander, R. A. Calvo, C. Eberhard, P. R. Ecklund, M. Feger, J. C. Glase, B. Goodman, J. M. Griffiths, J. B. Heiser, M. V. Hinkle, B. R. Land, T. J. McDonald, C. Reiss, A. H. Savitzky, W. R. Schaffner, M. L. Wilkinson

Distribution Requirement

In the College of Agriculture and Life Sciences, the biological sciences distribution requirement 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) will satisfy the requirement for introductory biology. The additional credits may be satisfied by any biological sciences courses except Biological Sciences 108, 201, 202, 205, 206, 301, or 302; 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 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) also satisfies the distribution requirement in the biological sciences.

In the College of Human Ecology, the natural sciences distribution requirement is for at least 6 credits selected from Biological Sciences 109–110, 101–103, 102–104, 105–106, or 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 mid-year may not be possible due to variation in presentation of topics. Students must receive permission of 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. Before course registration for the junior year, all students must apply for formal admission to the major with the associate director for academic affairs in 118 Stimson Hall. Students in the process of completing the required prerequisites to the major (see below) may be admitted on a provisional basis. Since modern biology has an important physical and quantitative

orientation, students are advised to undertake basic science courses that stress this orientation; these courses are signified by the word "recommended" in the listing of requirements below. A 2.75 Cornell cumulative grade point average is required for final admission to the major except for those students admitted directly to the major as freshmen (College of Agriculture and Life Sciences students only) or as transfers. In addition, final admission to the major requires satisfactory performance in the completion of the following:

- 1) One year of introductory biology for majors: 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. Students with a score of 4 must fulfill the introductory biology requirement by taking Biological Sciences 103–104 (or 4 credits of work in Biological Sciences 101–103, or 102–104, or 105–106 selected with the advice and approval of the instructors). Freshmen who have not taken the CEEB examination may register for an advanced standing examination in biology which is administered during fall orientation week.
- 2) One year of general chemistry: Chemistry 207–208 (recommended), or 215–216 (recommended), or 103–104.
- 3) One year of college mathematics, including at least one semester of calculus: Mathematics 111–112 (recommended), or 113–112 (recommended), or 105–106, or 111–105, or 113–105.
- 4) At least one semester of organic chemistry lectures: Chemistry 253, or 357, or 359. (See below for complete organic chemistry requirement for the major.)

Whenever possible, students should include introductory biology, chemistry, and mathematics in their freshman schedule and complete the organic chemistry lecture course in their sophomore year. A student is not encouraged to undertake a major in biological sciences unless performance in the above four subjects gives evidence of capacity to do superior work at a more advanced level.

In addition to the introductory courses in biology, chemistry, and mathematics, each student majoring in biological sciences must complete the following:

- 1) 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.
- 2) Physics: Physics 207–208 (recommended), or 112–213–214 (recommended), or 101–102.
- 3) Genetics: Biological Sciences 281.
- 4) Biochemistry: Biological Sciences 330 or 331.
- 5) One of the concentration areas outlined below.
- 6) The breadth requirement outlined below.
- 7) As an alternative to 5 and 6 above, the Program in General Biology.
- 8) Foreign language: Students registered in the College of Arts and Sciences must satisfy the language requirement as stated by that college. Students registered in the College of Agriculture and Life Sciences may 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 (CEEB) 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.

It is recommended that students planning graduate study or pursuing a research career take a course in statistics. Students should consult their faculty advisers when choosing appropriate courses in statistics.

Concentration Areas and Requirements

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 selection of advanced courses will form a coherent and meaningful unit. Due to 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 (Biological Sciences 311 and 319 or 416 and 418); and at least 4 additional credits selected from the following courses: Bio S 212, Invertebrate Zoology; Bio S 313, Histology: The Biology of the Tissues; Bio S 315 and 317, Ecological Animal Physiology; Bio S 385, Developmental Biology; Bio S 389, Embryology; Bio S 414, Vertebrate Morphology; Bio S 432, Survey of Cell Biology; Bio S 458, Mammalian Physiology; An Sc 427 and 428, Fundamentals of Endocrinology. Students electing to take one of the 3-credit courses (Biological Sciences 212, 315, 385, 414, 432, or An Sc 427) may complete the four credits by taking Bio S 410, Seminar in Anatomy and Physiology.
- 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, the student must take a physical chemistry sequence (Chemistry 389–390 or 287–288) and a biochemistry laboratory course (Biological Sciences 638 or 430 or 434). 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*: Five courses (including a plant physiology laboratory course) fulfill the concentration requirement, as follows: (a) Bio S 242 and 244 or 341 and 349, Plant Physiology; (b) Bio S 343, Taxonomy of Vascular Plants; (c) either Bio S 345, Plant Anatomy, or Bio S 347, Cytology; and (d) either Bio S 241, Plant Biology; Bio S 348, Phycology; Bio S 444, Comparative and Developmental Morphology of the Embryophyta; Bio S 448, Plant Evolution and the Fossil Record; Bio S 463 and 465, Plant Ecology; or Pl Pa 309, Introductory Mycology. Students are encouraged to take Bio S 499, Undergraduate Research in Biology. A student may elect to complete the required five courses by taking both courses in group (c) rather than taking any in group (d).
- 4) *Cell Biology*: Chemistry 300 or 215–216, Quantitative Chemistry; a laboratory (Biological Sciences 434 or 430); 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: Two courses selected from Group A and 6 additional credits distributed between Groups A and B and approved by the adviser.

Group A: Bio S 433, Cell Structure and Physiology; Bio S 438, Cell Proliferation and Oncogenic Viruses; Bio S 483, Molecular Aspects of Development.

Group B: Bio S 305, Basic Immunology, Lectures; Bio S 307, Basic Immunology, Laboratory; Bio S 313, Histology: The Biology of the Tissues; Bio S 345, Plant Anatomy; Bio S 347, Cytology; Bio S 485, Microbial Genetics, Lectures; Bio S 486, Immunogenetics; Bio S 496, Cellular Neurobiology; An Sc 419, Animal Cytogenetics; Micro 290, General Microbiology Lectures; Micro 291, General Microbiology Laboratory; Micro 484, Cytology of Prokaryotes Lectures; Micro 485, Cytology of Prokaryotes Laboratory.

Students interested in cell biology should complete a year of introductory chemistry, other than Chemistry 103–104, before the start of their sophomore year. Students are also urged to complete introductory biology in their freshman year.

Students anticipating graduate work in cell biology should consider taking a physical chemistry sequence (Chemistry 389–390 or 287–288).

- 5) *Ecology, Systematics, and Evolution*: Bio S 360, General Ecology; Bio S 477, Organic Evolution; a plant or animal physiology course; and at least one 400-level course with accompanying laboratory from within the concentration offerings. In addition to the latter course, students in this area must select at least two laboratory courses above and beyond those required of all biology majors (i.e., introductory biology, genetics, and organic chemistry). These two laboratory courses may include the physiology course or courses counted toward fulfillment of the breadth requirement, or both. It is strongly recommended that students planning graduate study take a course in statistics (ILR 210 or 311).
- 6) *Genetics and Development*: Nine credits, usually selected from the following courses: Bio S 282, Human Genetics; Bio S 347, Cytology; Bio S 385, Developmental Biology; Bio S 389, Embryology; Bio S 446, Cytogenetics; Bio S 477, Organic Evolution; Bio S 481, Population Genetics; Bio S 483, Molecular Aspects of Development; Bio S 484, Molecular Evolution; Bio S 485 and 487, Microbial Genetics; Bio S 486, Immunogenetics; Bio S 499, Undergraduate Research in Biology; Bio S 644, Plant Growth and Development; An Sc 419, Animal Cytogenetics; Pl Br 605, Physiological Genetics of Crop Plants.
- 7) *Neurobiology and Behavior*: The introductory course in Neurobiology and Behavior (Biological Sciences 321), and 12 additional credits, including a second course from the neurobiology and behavior offerings. Biological Sciences 420, 498, 499, and 720 may not be used as the second course. The remainder of the 12 credits may be in any course (such as physiology, developmental biology, cellular biology, ecology, or vertebrate or invertebrate biology) approved by the adviser as appropriate preparation for work or advanced study in neurobiology and behavior or in related subjects. Courses used to fulfill the concentration requirements may not be counted toward fulfillment of the breadth requirement.
- 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.

Breadth Requirement

To fulfill the breadth requirement in the biological sciences major, students must pass a total of two courses outside of their concentration area selected from two of the categories listed below. Students may not count two courses for breadth credit if one course

is a prerequisite to the other course. Students should consult their faculty advisers when choosing the courses to meet this requirement.

- 1) *Animal Physiology and Anatomy*: Biological Sciences 212, 214, 274, 311, 313, 315, 389, 416.
- 2) *Botany*: Biological Sciences 241, 242 and 244, 341 and 349, 343, 345, 348, 441; Plant Pathology 309.
- 3) *Cellular and Developmental Biology*: Biological Sciences 305, 347, 385, 432, 483; Microbiology 290.
- 4) *Ecology, Systematics, and Evolution*: Biological Sciences 260, 360, 364, 471, 472, 475, 476, 477; Entomology 212.
- 5) *Neurobiology and Behavior*: Biological Sciences 321.

Note: Biological Sciences 385 and 432 may not be used as breadth courses by students concentrating in animal physiology and anatomy.

Biological Sciences 347 may not be used as a breadth course by students concentrating in botany.

Biological Sciences 305, 313, 345, 347, 432, 483, and Microbiology 290 may not be used as breadth courses by students concentrating in cell biology.

Biological Sciences 347, 385, 389, 477, and 483 may not be used as breadth courses by students concentrating in genetics and development.

Biological Sciences 471, 472, 475, or 476 may not be used as a breadth course if Biological Sciences 274 is counted as a breadth course.

Program in General Biology

Students choosing the general biology option must fulfill all the general requirements for the biology major (chemistry, genetics, biochemistry, etc.) except one of the concentration areas and the breadth requirement. The specific requirements for the program are:

- 1) Ecology (Biological Sciences 260 or 360).
- 2) Neurobiology and Behavior (Biological Sciences 321).
- 3) A physiology course from the following: Bio S 242 and 244 or 341 and 349, Plant Physiology; Bio S 311, Introductory Animal Physiology, Lectures; Bio S 315, Ecological Animal Physiology, Lectures; Bio S 416, General Animal Physiology: A Quantitative Approach, Lectures.
- 4) One course from the following: Bio S 212, Invertebrate Zoology; Bio S 241, Plant Biology; Bio S 274, The Vertebrates; Bio S 343, Taxonomy of Vascular Plants; Bio S 348, Phycology; Entom 212, Insect Biology; Micro 290 and 291, General Microbiology.
- 5) At least one course concentrating on plants. This may be satisfied by a course that also fulfills requirement 3 or 4.
- 6) At least one course with a laboratory. This may be satisfied by a course that also fulfills requirement 3 or 4 or 5.
- 7) A biological sciences course offered for 2 or more credits having as a prerequisite one of the following: Bio S 241, Plant Biology; Bio S 242 or 341, Plant Physiology; Bio S 260 or 360, Ecology; Bio S 274, The Vertebrates; Bio S 281, Genetics; Bio S 311, Introductory Animal Physiology, Lectures; Bio S 315, Ecological Animal Physiology, Lectures; Bio S 321, Neurobiology and Behavior; Bio S 330 or 331, Principles of Biochemistry; Bio S 416, General Animal Physiology: A Quantitative Approach, Lectures.

Independent Research and Honors Program

Individual research projects under the direction of a faculty member are encouraged as part of the program of study within a concentration. Applicants for research projects are accepted by the individual faculty members, who take into account students' previous academic accomplishments, interests, and

goals, and the availability of space and equipment suitable for the proposed project. Students accepted for independent research will enroll for credit in Bio S 499, Undergraduate Research in Biology, with the written permission of the faculty supervisor. Any faculty member in the Division of Biological Sciences may act as a supervisor. Faculty supervisors outside the division are acceptable only if a faculty member of the division agrees to take full responsibility for the quality of the work. Information on faculty research activities and undergraduate research opportunities is available in the Behrman Biology Center, G20 Stimson Hall.

Research credits may *not* be used in completion of the following concentration areas: animal physiology and anatomy; biochemistry; botany; cell biology; and ecology, systematics, and evolution. No more than 4 credits of research may be used in completion of the following concentration areas: genetics and development, and neurobiology and behavior.

The honors program in biological sciences is designed to offer advanced training in laboratory or field research through the performance of an original research project under the direct guidance of a member of the faculty. Applications for the honors program are available in the Office for Academic Affairs, 118 Stimson Hall, and must be submitted to the Honors Program Committee by the first week of classes of the senior year. To qualify for the program, students must have completed at least 30 credits at Cornell; have an overall Cornell cumulative grade point average of at least 3.0; and have at least a 3.0 Cornell cumulative grade point average in all biology, chemistry, mathematics, and physics courses. In addition, candidates must have a faculty member to supervise their research. Any faculty member in the Division of Biological Sciences may act as a supervisor. Faculty supervisors outside the division are acceptable only if a faculty member of the division agrees to take full responsibility for the quality of the work. In rare cases, research done elsewhere may be presented for honors, providing that *prior approval* of the Honors Program Committee has been given. An honors candidate usually enrolls for credit in Bio S 499, Undergraduate Research in Biology, under the direction of the faculty member acting as honors supervisor. Participation in an honors research seminar is required. 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 encouraged to begin their research projects in their junior year, though students 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 the Office for Academic Affairs. Information on faculty research activities and undergraduate research opportunities 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 has faculty and elected student members, and welcomes advice and suggestions from all interested persons.

Advising

Students in need of academic advising or counseling 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.

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.

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General Courses

101–102 Biological Sciences, Lectures 101, fall; 102, spring. 2 credits each term. Prerequisite: concurrent enrollment in Biological Sciences 103 (fall) or 104 (spring). 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, Oct. 1 and Nov. 5; spring, Mar. 4 and Apr. 15. K. K. Adler.

Designed both for students who intend to specialize in biological sciences and for those specializing in other subjects, such as the social sciences or humanities, who want to obtain a thorough knowledge of biology as part of their general education. Plant and animal materials are considered together rather than in separate units. The fall semester covers the chemical and cellular basis of life, energy transformations, anatomy, physiology, and behavior. The spring semester covers genetics and development, evolution, ecology, the origin of life, and the diversity of living organisms. Each topic is considered in the light of modern evolutionary theory.

103–104 Biological Sciences, Laboratory 103, fall; 104, spring. 2 credits each term. Prerequisite: concurrent enrollment in Biological Sciences 101 (fall) or 102 (spring), or written permission of instructor. 103 is prerequisite to 104, unless written permission

is obtained from instructor. S-U grades optional, with permission of instructor. No admittance after second week of classes.

Lab, M T W or R 1:25–4:25, M or W 7:30–10:30 p.m., T R or S 8–11, or F 10:10–1:10. One 3-hour lab each week and a weekly lec section for discs, special lecs, etc. To accommodate weekly lec section, students must reserve M W and F 9:05 or 10:10 since the day of the lec section varies throughout the semester. J. C. Glase, P. R. Ecklund, and staff.

A laboratory course emphasizing the methods used by biologists to discover new knowledge. Students design and perform investigations in biology. In preparation for this, exposure is given to basic biological concepts, research methodologies, relevant data analysis techniques and statistics, instrumentation, and laboratory techniques in all of the major areas of biology. Research projects include investigative design, data analysis, and communication of investigative results and conclusions.

105–106 Introductory Biology 105, fall; 106, spring. 4 credits each term (or 2 credits for transfer or advanced placement students, with permission of instructor). Prerequisite: 105 is prerequisite to 106, unless written permission is obtained from instructor. S-U grades optional, with written permission of instructor. May not be taken for credit after Biological Sciences 101–104 or 109–110. Fee, \$5.

Lec, M 12:20; disc, 1 hour each week, to be arranged at first lec meeting; additional study and lab hours arranged at student's convenience each week. E. R. Loew, J. M. Calvo, J. M. Bunch. Designed primarily for students who intend to specialize in the biological or other sciences; also open to nonmajors who want a more comprehensive biology course than the one for nonmajors (Biological Sciences 109–110). Recommended for students whose first language is not English. The course is taught in an autotutorial format and students are expected to put in some time *each* week (students can seldom work ahead and there are severe penalties for falling behind). Laboratory work is an integral part of the course.

Course material is divided into core units that must be completed by all students. Students are expected to achieve greater than 80 percent mastery of required material.

108 Interactive Computing for Students of Biological Sciences Spring. 1 credit. Not open to students with prior courses in computing.

Lec, T 1:25; lec every other week. H. C. Howland. An introduction to computing using the interactive language BASIC with a discussion of other algebraic computing languages such as FORTRAN. Students are issued tickets for 10 hours of computing time at the Division of Biological Sciences interactive computing facility. Applications to problems in the biological sciences for which microcomputers may be used are emphasized.

109–110 Biology for Nonmajors 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 11:15; 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, Oct. 6 and Nov. 12; spring, Feb. 25 and Apr. 8. Staff.

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.

200 Special Studies in Biology Fall or spring. 1–3 credits. Prerequisites: written permission of instructor and of the associate director of the Division of Biological Sciences (a special form for this purpose is available in Stimson 118). S-U grades optional, with permission of instructor.

Hours to be arranged. Staff. 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. This course ordinarily is taken only by transfer students who have already had training equivalent to the portion of the regular course that is to be omitted. May not be substituted for 100-level courses.

201–202 History of Biology (also History 287–288) 201, fall; 202, spring. 3 credits each term. Prerequisite: one year of introductory biology. 201 is not prerequisite to 202. S-U grades optional.

Lecs, T R 10:10–11:30. W. B. Provine. An examination of the history of biology, emphasizing the interaction of biology and culture. Original writings of biologists constitute the bulk of reading assignments. The fall semester covers the period from classical antiquity to 1900. The spring semester is devoted entirely to twentieth-century biology.

205 Biomedical Ethics (also Philosophy 245) Fall. 3 credits. Primarily for sophomores, juniors, and seniors; permission of instructor required for graduate students.

Lecs and discs, M W F 1:25. S. M. Brown. 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); genetic modification; recombinant DNA technology; contraception, abortion, and infanticide; euthanasia and suicide; the allocation of scarce medical resources; physician-patient relationships; and health care systems. Each topic is covered first in a lecture and then, with the assigned readings, made a topic for discussion.

206 Environmental Ethics (also Philosophy 246) Spring. 3 credits. Open to sophomores, juniors, and seniors; permission of instructor required for graduate students. Prerequisite: one year of introductory biology.

Lecs, M W F 1:25. S. M. Brown. 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; the concept of pollution; and the ideas of diversity, balance, and stability in the natural environment.

[208 Biological Discovery Laboratory Spring. 2 credits. Limited to 30 students who apply for admission and are recommended by their instructors in Biological Sciences 103. Prerequisite: Biological Sciences 103. Not offered 1981–82.

Labs, T R 1:25–4:25. Staff. A research-oriented alternative to Biological Sciences 104. Designed to instruct students in the ways that scientists ask questions about living things and design and carry out observations or experiments to answer these questions. Students work individually on extended research problems that they design.

Instruction is highly individualized and aimed at improving each student's ability to ask meaningful questions, organize and quantify observations, analyze research data, and relate results to previously reported biological findings. Written research reports are prepared and oral reports presented. Specific research techniques are introduced when needed.]

300 Laboratory Methods in Biology Summer, 6-week session. 3 credits. Prerequisite: one year of introductory college biology. Fee, \$5.

Lecs and labs, M T W R F 1:30–4 for 6 weeks. L. D. Uhler.

For students who intend to teach or follow some phase of biology as a profession. Subjects covered: collection, preservation, and storage of materials; preparation of bird and mammal study skins; injection of circulatory systems with latex; clearing and staining of small vertebrates; and preparation and staining of squashes, smears, whole mounts, and sections. No formal exams. Grade is based on required work submitted at the end of the course.

301 Biology and Society I: The Biocultural Perspective (also Anthropology 301 and Biology and Society 301) Fall. 3 or 4 credits (4 credits by arrangement with instructor). Prerequisite: one year of introductory biology. S-U grades optional. This is part of the two-semester core course for the biology and society major and is also available to other students who have fulfilled the necessary prerequisite.

Lecs, M W F 9:05. D. J. Greenwood. Human biology, behavior, and institutions are viewed as the ongoing products of the interactions between human biological evolution and cultural change. These interactions are documented with reference to the evolution of the capacity for culture; human groups and institutions; language, meaning, and cultural "realities"; and major models of human nature and human institutions.

302 Biology and Society II: Biology, Society, and Ethics (also Anthropology 302 and Biology and Society 302) Spring. 3 or 4 credits (4 credits by arrangement with instructor). Prerequisite: Biological Sciences 301. S-U grades optional. This is the second semester of the two-semester core course for the biology and society major and is also available to other students who have taken 301.

Lecs, M W F 9:05. D. J. Greenwood, S. J. Risch. This course considers the complex intellectual, practical, and ethical issues centering on the relationships between biological and social phenomena. Specific current issues such as pollution, genetic counseling, and recombinant DNA research are considered; and an effort is made to develop viable biocultural ethics for dealing with such problems.

305 Basic Immunology, Lectures (also Veterinary Medicine 315) Fall. 2 credits. Recommended: basic courses in microbiology and biochemistry.

Lecs, T R 9:05. Evening prelims: Oct. 8 and Nov. 19. 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.

309 Techniques In Animal Handling and Surgery

Intercession. 2 credits. Limited to 12 students, with preference given to students who are registered in an independent research course. Prerequisite: written permission of instructor. S-U grades only. Fee, \$5.

Lecs and labs, M T W R F 9–4:30 for 3 weeks.
A. van Tienhoven.

Audiovisual materials and actual experience are used in this minicourse to teach students techniques needed for independent research and honors projects.

498 Teaching Experience Fall or spring.

1–4 credits. Enrollment limited. Prerequisites: previous enrollment in the course to be taught or equivalent, and written permission of instructor. S-U grades optional, with permission of instructor. *Students in the College of Arts and Sciences may not count credits from this course toward the 100 arts college credits required for graduation.*

Hours to be arranged. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and assisting in biology courses. This experience may include supervised participation in a discussion group, assisting in a biology laboratory, assisting in field biology, or tutoring. Biological Sciences courses currently offering such experience include Biological Sciences 105–106, 274, 324, 330, 430, 464, 468, and 475.

499 Undergraduate Research In Biology Fall or spring.

Variable credit. Prerequisite: written permission from the staff member who will supervise the work and assign the grade. S-U grades optional. Any faculty member in the Division of Biological Sciences may act as a supervisor. Faculty supervisors outside the division are acceptable only if a faculty member of the division agrees to take full responsibility for the quality of the work. *This course is divided into multiple sections as printed in the Course Rosters.* Students must register under supervisor's assigned section number, or section 01 if supervisor was not assigned a section number. Students registering in section 01 should notify the Office for Academic Affairs in Stimson 118.

Hours to be arranged. Staff.

Practice in planning, conducting, and reporting independent laboratory and library research programs.

Research credits may *not* be used in completion of the following concentration areas: animal physiology and anatomy; biochemistry; botany; cell biology; and ecology, systematics, and evolution.

No more than 4 credits of research may be used in completion of the following concentration areas: genetics and development, and neurobiology and behavior.

600 Introduction to Scanning Electron

Microscopy Fall or spring, weeks 1–4. 1 credit. Primarily for graduate students, but open to seniors who can demonstrate a need for the course. Limited to 10 students. Prerequisite: permission of instructor. S-U grades only.

Lec and lab to be arranged. M. V. Parthasarathy, M. K. Hausmann.

The course is a general introduction to the principles and the proper use of the scanning electron microscope. Emphasis is on using the instrument to observe biological specimens and on methods of preparing biological material for scanning electron microscopy.

602 Advanced Electron Microscopy for

Biologists I Spring, weeks 1–3. 1 credit. Primarily for graduate students. Limited to 8 students. Prerequisites: Biological Sciences 603 or equivalent, and permission of instructor. S-U grades only.

Lec, T 11:15; disc to be arranged; labs, T R 1:25–4:25. M. V. Parthasarathy.

High-resolution electron microscopy; problems of obtaining high-resolution electron micrographs of biological specimens; visualization of macromolecules.

603 Electron Microscopy for Biologists Fall.

3 credits. Primarily for graduate students, but open to upperclass students. Limited to 12 students, with preference given to students with research projects requiring electron microscopy. Prerequisites: either Biological Sciences 300, 313, 345, or 347, or equivalent, and written permission of instructor. Registration during course enrollment recommended. S-U grades optional.

Lec, T 11:15; labs, M W 1:25–4:25, T R 1:25–4:25, or W F 8–11. M. V. Parthasarathy.

Principles of electron microscopy; histological techniques for electron microscopy, such as ultrathin sectioning, negative staining, and metal shadowing; and interpretation of results. A brief introduction to scanning electron microscopy is also included.

604 Advanced Electron Microscopy for

Biologists II Spring, weeks 4–6. 1 credit. Primarily for graduate students. Limited to 8 students. Prerequisites: Biological Sciences 603 or equivalent, and permission of instructor. S-U grades only.

Lec, T 11:15; disc to be arranged; labs, T R 1:25–4:25. M. V. Parthasarathy.

Principles of autoradiography at both light microscopy and electron microscopy levels; incorporation of radioactive material into biological specimens for autoradiography; problems of resolution and quantitative aspects of autoradiography.

606 Advanced Electron Microscopy for

Biologists III Spring, weeks 7–9. 1 credit. Primarily for graduate students. Limited to 8 students. Prerequisites: Biological Sciences 603 or equivalent, and permission of instructor. S-U grades only.

Lec, T 11:15; disc to be arranged; labs, T R 1:25–4:25. M. V. Parthasarathy.

Principles of freeze fracturing and freeze substitution techniques; freezing artifacts and interpretation of images.

608 Advanced Electron Microscopy for

Biologists IV Spring, weeks 10–14. 1 credit. Primarily for graduate students. Limited to 6 students. Prerequisites: Biological Sciences 603 or equivalent, and either Biological Sciences 602, 604, or 606. S-U grades only.

Hours to be arranged. M. V. Parthasarathy. Project in biological ultrastructure.

702 X-Ray Elemental Analysis in Biology Spring.

1 credit. Limited to 8 students. Prerequisites: Biological Sciences 600 or 603, and permission of instructor. S-U grades only. Offered alternate years.

Lec and lab to be arranged. M. V. Parthasarathy, M. K. Hausmann.

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)****Animal Physiology and Anatomy**

[212 Invertebrate Zoology Spring. 3 credits. Limited to 20 students. Prerequisite: one year of introductory biology for majors. Not offered 1981–82.

Lecs, T R 11:15; lab, T 2–4:25. A. W. Blackler. An introduction to the structure, function, and development of invertebrate animals of the major phyla, with emphasis on the phylogenetic relationships.]

214 Biological Basis of Sex Differences (also Women's Studies 214) Spring. 3 credits.

Prerequisite: one year of introductory biology. S-U grades optional.

Lecs and discs, M W F 9:05. 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.

274 The Vertebrates Spring. 5 credits. Primarily for

sophomores; this course is a prerequisite 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. 23. Staff.

An introduction to the evolution, classification, comparative anatomy, life history, and behavior of vertebrate animals. Laboratory dissection and demonstration are concerned with structure, classification, systematics, biology of species, and studies of selected aspects of vertebrate life.

311 Introductory Animal Physiology, Lectures (also Veterinary Medicine 346) Fall. 3 credits.

Prerequisites: one year of college biology, chemistry, and mathematics. May not be taken for credit after Biological Sciences 416.

Lecs, M W F 11:15. K. A. Houpt and staff.

A general course in vertebrate physiology emphasizing the basic characteristics of the circulatory, nervous, pulmonary, renal, and gastrointestinal systems; energy metabolism; endocrinology; and reproductive physiology. Neural and hormonal control of function is emphasized.

313 Histology: The Biology of the Tissues Fall.

4 credits. Prerequisite: one year of introductory biology. Recommended: background in vertebrate anatomy and organic chemistry or biochemistry.

Lecs, T R 11:15; labs, T R 2–4:25. W. A. Wimsatt. Provides the student with a basis for understanding the microscopic, fine-structural, and functional organization of vertebrates, as well as the methods of analytic morphology at the cell and tissue levels. The dynamic interrelations of structure, composition, and function in cells and tissues are stressed.

315 Ecological Animal Physiology, Lectures Fall.

3 credits. Prerequisite: one year of introductory biology for majors. Offered alternate years.

Lecs, M W F 10:10. W. N. McFarland and staff.

An introductory course for students interested in ecology and physiology. The characteristics of the physical environment that are important to organisms are discussed; and representative physiological, behavioral, and morphological adaptations of vertebrate and invertebrate animals to their environments are analyzed.

316 Cellular Physiology Spring. 4 credits. Limited

to 100 students, with preference given to students concentrating in animal physiology and anatomy. Each lab section limited to 25 students. Prerequisite: concurrent or previous enrollment in Biological Sciences 330 or 331.

Lecs, M W F 9:05; lab, M T W or R 1:25–4:25.

R. A. Corradino and staff.

Lectures introduce students to the most current information on the ways cells regulate themselves and neighboring cells, and on what molecules are involved in these regulatory processes. Laboratories are closely related to lectures and provide practical experience with experiments on such cellular functions as nutrient transport, macromolecular biosynthesis, and cell proliferation.

317 Ecological Animal Physiology, Laboratory Fall. 1 credit. Limited to 24 students. Prerequisite: concurrent enrollment in Biological Sciences 315. Offered alternate years.

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 methods.

319 Introductory Animal Physiology, Laboratory (also Veterinary Medicine 348) Fall. 2 credits.

Limited to 100 students, with preference given to students concentrating in animal physiology and anatomy; each lab section limited to 25 students. Prerequisite: concurrent enrollment in Biological Sciences 311, or permission of instructor based on previous meritorious performance in another introductory physiology course. S-U grades optional. Lab, M T W or R 1:25–4:25; autotutorial preview-disc to be arranged. W. B. Currie.

A series of student-run experiments exposing the objectives, ethics, techniques, and analysis of procedures in systems physiology conducted *in vivo* and *in vitro* with mammals. Students prepare for laboratories in supervised autotutorial sessions with readings and videotapes and are tested before admission to each laboratory. Reports describing the experiments are required. Grading is based on admission tests and evaluation of reports.

351 Biological Rhythms with a Period of One Day to One Year Fall. 1 credit. Prerequisites: one year of introductory biology and either Mathematics 106, 111, or 113.

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 Stimson G25. Staff (coordinator: W. Hansel).

412 Special Histology: The Biology of the Organs Spring. 4 credits. Limited to 12 students. Prerequisite: Biological Sciences 313 or written permission of instructor. Offered alternate years.

Lecs, W F 9:05; labs, W F 2–4:25. W. A. Wimsatt. A continuation of Biological Sciences 313. The microscopic and ultrastructural organization of the principal vertebrate organ systems are studied in relation to their development, functional interaction, and special physiological roles. Courses 313 and 412 together present the fundamental aspects of the microscopic and submicroscopic organization of the vertebrate. The organization of the course involves student participation in lecture-seminars and independent project work supplementary to the regular work of the laboratory. The latter enables students to gain practical experience with histological and histochemical preparative techniques.

414 Vertebrate Morphology (also Veterinary Medicine 700) Spring. 3 credits. Prerequisite: graduate standing, or Biological Sciences 274 or equivalent. (Prerequisite waived for students concentrating in animal physiology and anatomy.) S-U grades optional.

Labs, T R 2–4:25. H. E. Evans. Student dissections of the dog serve as the basis for a functional consideration of the major component parts of the body and its organ systems. This is followed by a dissection of the cow. Other species (fish to mammal) of interest to members of the class may also be dissected.

416 General Animal Physiology: A Quantitative Approach, Lectures Spring. 3 credits.

Prerequisites: one year of college biology and physics. S-U grades optional. May not be taken for credit after Biological Sciences 311.

Lecs, M W F 10:10. H. C. Howland. The principles of animal physiology are developed through consideration of the functioning of cells, tissues, and organs. Specific topics discussed include respiration, metabolism, circulation, excretion, body mechanics, muscle contraction, nerve action, sensory reception, and central nervous system function. A quantitative, systems-theoretical approach is emphasized.

418 General Animal Physiology, Laboratory Spring. 2 credits. Prerequisite: concurrent enrollment in Biological Sciences 416 or equivalent.

Lec, W 7:30 p.m.; lab, M or W 1:25–4:25. H. C. Howland. Students are introduced to basic techniques utilized in the study of the physiology of animal tissues. Experiments cover topics dealing with respiration, properties of muscle, circulation, activity of nerves, and osmotic phenomena.

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 independently design and execute experiments with limited objectives.

458 Mammalian Physiology Spring. 6 credits. Enrollment limited. Prerequisite: Biological Sciences 311 or 416, or equivalent with written permission of instructor.

Lecs, M W F 8; lab, M or W 1:25–4:25; 4 additional hours to be arranged. K. W. Beyenbach and staff. Selected topics in mammalian physiology are discussed in the lecture and concurrently studied in the laboratory. Topics are selected from the following: physiology of membranes and epithelia; nerve and muscle; heart and circulation; autonomic, somatic, and sensory nervous systems; respiration; digestion; salt and water balance; acid-base balance; and endocrine regulation.

610 Mammalian Neurophysiology (also Veterinary Medicine 753) Spring. 3 credits. Limited to 16 students. Prerequisites: two years of college biology. Recommended: courses in biochemistry and physics. Offered alternate years.

Lec and disc, R 10:10; lab, R 1:25–4:25; additional hours to be arranged. E. L. Gasteiger. Studies include electrical activity of cells; reflexes; decerebrate rigidity; acoustic microphonic response; subcortical stimulation; and evoked and spontaneous cortical activity.

[615 Nutrition and Physiology of Mineral Elements (also Veterinary Medicine 759 and Nutritional Sciences 659)] Fall. 2 credits.

Prerequisites: courses in basic physiology, intermediate biochemistry, and general nutrition. Offered alternate years. Not offered 1981–82. Lec, 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) Spring. 4 credits.

Prerequisites: courses in animal or plant physiology, or permission of instructor. Lec, 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 utilization 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, W 2–4:25. E. L. Gasteiger, E. R. Loew. Theory and practice of electrophysiological techniques currently used for study of the nervous and muscular systems in normal and diseased states. Topics include electroencephalography, electromyography, electroretinography, and evoked potentials.

[618 Biological Membranes and Nutrient Transfer (also Veterinary Medicine 752)] Spring. 2 credits.

Prerequisites: courses in animal or plant physiology, quantitative and organic chemistry, and physics, and permission of instructor. Recommended: courses in cellular physiology and elementary physical chemistry. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1981–82.

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. Not offered 1981–82.

Lecs, T R 11:15. A. Bensadoun. Advanced course on biochemical, metabolic, and nutritional aspects of lipids. Emphasis on critical analysis of current topics in lipid methodology; lipid absorption; lipoprotein secretion, structure, and catabolism; mechanism of hormonal regulation of lipolysis and fatty acid synthesis; and cholesterol metabolism and atherosclerosis.]

658 Molecular Mechanisms of Hormone Action (also Veterinary Medicine 758) Spring. 2 credits.

Prerequisite: permission of instructor. Offered alternate years. Lec, T R 10:10. R. A. Corradino. An advanced course developed from the current literature on endocrine mechanisms.

719 Graduate Research in Animal Physiology and Anatomy (also Veterinary Medicine 600) Fall or spring. Variable credit. Prerequisite: written permission of section chairperson and staff member who will supervise the work and assign 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)

Anatomy and Behavior of the Gull (Biological Sciences 312)

Animal Reproduction and Development (Animal Science 220)

Cellular Neurobiology (Biological Sciences 496)

Developmental Biology (Biological Sciences 385)

Embryology (Biological Sciences 389)

Fundamentals of Endocrinology (Animal Science 427-428)

Insect Morphology (Entomology 322)

Integration and Coordination of Energy Metabolism (Biological Sciences 637)

Neuroanatomy (Veterinary Medicine 504)

Parasitic Helminthology (Veterinary Medicine 440)

Population Biology of Health and Disease (Veterinary Medicine 330)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

Vision (Biological Sciences 395)

Biochemistry and Cell Biology

132 Orientation Lectures in Biochemistry

Spring, weeks 1-3. Noncredit. 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; first 3 Saturdays 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 previously studied biochemistry and who do not expect to pursue it further. Not recommended for students who have taken organic chemistry. Prerequisite: Chemistry 104 or 208 or equivalent. S-U grades optional.

Lecs, M W F 12:20. J. M. Griffiths.
A brief introductory section relating organic chemistry to biochemistry is given, followed by the biochemical material in the usual one-semester introductory courses. Topics of general interest are also included.

330-331 Principles of Biochemistry Introductory biochemistry is offered in two formats: individualized instruction (330) and lectures (331). *Individualized instruction is offered to a maximum of 150 students each semester. Lectures given fall semester only.*

330 Principles of Biochemistry, Individualized Instruction Fall or spring. 4 credits. Prerequisite: Chemistry 253 or 358 or equivalent. May not be taken for credit after Biological Sciences 331.

Discs, M W F 8 or 10:10; additional hours to be arranged. No formal lecs. Fall: M. Ferger and staff; spring: M. Ferger, R. Wu, and staff.

The focal point for this course is a study center—open mornings, afternoons, and some evenings—where students find materials, get help, participate in discussions, and take exams. Students are required to master a minimum body of core material. The pace at which this material is assimilated is largely self-determined. Students who want to go beyond core material have available a wide range of electives, including discussions of research papers and independent study of a variety of problems and *Scientific American* articles. Grades are determined primarily by the amount of elective work satisfactorily completed and by a final exam.

331 Principles of Biochemistry, Lectures Fall;

also offered during the 6-week summer session.

4 credits. 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, J. K. Moffat, R. Barker.

Chemistry of biological substances, presented in a lecture format. Course content is similar to that of Biological Sciences 330.

430 Basic Biochemical Methods Fall or spring. 4 credits. Enrollment limited. Prerequisites: Biological Sciences 330 or 331, a lab course in organic chemistry, and permission of instructor.

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 modular course designed to introduce the student to the biochemical techniques most commonly used in various biological fields. Students select two of the following modules: clinical and nutritional biochemistry, lipids, isolation and characterization of cell components, or nucleic acids. An enzymology module is taken by all students.

432 Survey of Cell Biology Spring; also offered

during the 3-week summer session. 3 credits.

Prerequisite: Biological Sciences 330 or 331 or equivalent.

Lecs, M W F 11:15. J. T. Lis, M. V. Hinkle, and staff.
A survey of material covered in depth in Biological Sciences 433, 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.

433 Cell Structure and Physiology Fall.

2 credits. Prerequisite: Biological Sciences 330 or 331 or permission of instructor. Not offered 1981-82.

Lecs, T R 12:20. R. E. MacDonald.
The functional aspects of cells and their organelles: bioenergetics, transport, movement, growth, nutrition, and structure are examined in detail in free-living cells, differentiated cells, and highly specialized cells. The course attempts to integrate current knowledge about cell biochemistry, structure, and function with the role of the cell in its environment and in its interrelationship with other cells.]

434 Laboratory in Cell Biology Spring. 4 credits. Enrollment limited. Prerequisite: written permission of instructor.

Labs, M W 1:25-4:25 or R 9:05-4:25; disc to be arranged. J. Gibson.

The course provides experience in experimental design and stresses techniques for handling and experimenting with cells of different kinds.

435-436 Undergraduate Biochemistry Seminar

435, fall; 436, spring. 1 credit each term. May be repeated for credit. Enrollment limited; upperclass students only. 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: D. B. Wilson; spring: R. E. McCarty.

A group of selected papers from the literature are critically evaluated during six or seven two-hour meetings. Fall: the role of genetic engineering in the study of genetic control mechanisms; spring: photosynthesis.

438 Cell Proliferation and Oncogenic Viruses

Spring. 2 credits. Prerequisite: Biological Sciences 330 or 331. Recommended: Biological Sciences 281.

Lecs, T R 12:20. V. M. Vogt.

A description of the growth properties of animal cells in culture, followed by discussions of the changes in cells that are induced by tumor viruses and carcinogens. Topics include macromolecular growth factors, contact inhibition, cell surface properties, cell cytoskeleton, transcription and translation of viral and host genes, and integration of viral DNA into host chromosomes.

456 Molecular Biology of Yeast Spring. 3 credits.

Prerequisites: Biological Sciences 281 and a course in organic chemistry. Not offered 1981-82; first offered spring 1983.

Lecs, M W F 9:05. G. R. Fink.

Saccharomyces cerevisiae, a single-celled lower eucaryote, possesses physiological, biochemical, and genetic characteristics that make it an ideal organism for investigating many fundamental aspects of gene expression in eucaryotes. These characteristics are discussed, together with current research methodologies (tetrad analysis, fine structure mapping, mutant isolation, transformation, and recombinant DNA techniques) and their application in understanding phenomena such as cell division and determination of mating type.]

631 Protein Structure and Function Fall.

2 or 3 credits (3 credits with discussion).

Prerequisites: introductory biochemistry, physical chemistry, and organic chemistry; or permission of instructor. S-U grades optional, with permission of instructor.

Lecs, M W 9:05; disc, F 9:05. G. W. Feigenson and staff.

Lectures on protein structure and the nature of enzymatic catalysis. Discussions cover some of these areas in more depth, through recent research papers.

632 Bioenergetics and Membranes Spring.

2 credits. Prerequisites: Biological Sciences 330 or 331, and either Chemistry 358 or 360; or written permission of instructor. Recommended: physical chemistry.

Lecs, T R 11:15. P. C. Hinkle.
Oxidative phosphorylation, photophosphorylation, active transport, muscle contraction, and the structure of biological membranes.

633 Biosynthesis of Macromolecules Fall.

2 credits. Prerequisite: Biological Sciences 330 or 331.

Lecs, T R 9:05. J. W. Roberts, D. B. Wilson.
DNA, RNA, and protein synthesis; regulation of gene expression; and other topics.

634 Biochemistry of the Vitamins and Coenzymes (also Nutritional Sciences 634)

Spring. 2 credits. Prerequisites: Biological Sciences 330 or 331 or equivalent, and either Chemistry 358 or 360. Offered alternate years.

Lecs, T R 10:10. M. N. Kazarinoff.
The chemical, biochemical, and nutritional aspects of the vitamins and coenzymes.

635 Metabolic Regulation (also Nutritional

Sciences 635) Spring. 2 credits. Prerequisites: Biological Sciences 330 or 331, and either Chemistry 358 or 360; or written permission of instructor. Recommended: physical chemistry.

Lecs, T R 9:05. W. L. Dills and staff.
The study of enzymes and the molecular mechanisms of metabolic regulation.

637 Integration and Coordination of Energy Metabolism (also Nutritional Sciences 636) Fall 3 credits. Prerequisite: Biological Sciences 330 or 331 or equivalent.

Lecs, M W F 9:05. Evening prelims: Sept. 24, Oct. 22, and Nov. 19. W. J. Arion and staff.
The elements of caloric homeostasis are developed through correlations of the structural, functional, and metabolic characteristics of the major animal tissues and organs. Mechanisms that control energy metabolism within individual tissues and coordinate these processes in the intact animal are analyzed in the contexts of selected physiologic and pathologic stresses.

638 Intermediate Biochemical Methods Spring. 4 credits. Primarily for undergraduates majoring in biochemistry and for graduate students with a minor in biochemistry. Prerequisites: Biological Sciences 330 or 331, and permission of instructor.

Undergraduates must obtain permission of instructor by the last day of the course enrollment period.
Lab, T or R 9:05–4:25. A lab section is also scheduled W 9:05–4:25, if enrollment requires it.
E. B. Keller, L. A. Heppel, and staff.
Selected experiments on proteins, enzymes, DNA, and bioenergetics to illustrate basic biochemical principles. The course emphasizes quantitative aspects and techniques currently used in biochemical research.

732–738 (731–739) 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 automatically register students for ½ credit.) Prerequisite: Biological Sciences 330 or 331 or equivalent. S-U grades only.

Lectures and seminars on specialized topics.

Fall 1981: three topics are offered.

733 Plastid Biogenesis ½ credit.
T R 12:20 (6 lecs); Sept. 8–24. A. T. Jagendorf.

735 Molecular Basis of Sickle Cell Disease ½ credit.
T R 12:20 (6 lecs); Sept. 29–Oct. 15.
S. J. Edelstein.

737 Chemical Carcinogenesis ½ credit.
T R 12:20 (6 lecs); Oct. 27–Nov. 12.
T. C. Campbell.

Spring 1982: four topics are offered.

732 Crystallography of Macromolecules ½ credit.
T R 12:20 (6 lecs); Feb. 2–18. J. K. Moffat.

734 Nuclear Magnetic Resonance (NMR) of Macromolecules 1 credit.
W F 12:20 (12 lecs); Feb. 3–Mar. 12.
G. W. Feigensohn.

736 Proteases in Regulation ½ credit.
T R 12:20 (6 lecs); Apr. 6–22. J. F. Wootton.

738 Cloning and Structural Analysis of Genes ½ credit.
W F 12:20 (6 lecs); Apr. 21–May 7. R. Wu.

830 Biochemistry Seminar Fall or spring. Noncredit.
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): J. K. Moffat.
Research in the laboratories of 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 all graduate students (first-year students excepted) majoring in biochemistry. S-U grades only.
Sem, M 7:30–9 p.m. E. Racker, V. M. Vogt, J. K. Moffat.

Related Courses in Other Departments

Lipids (Biological Sciences 619)

Molecular Aspects of Development (Biological Sciences 483)

Molecular Mechanisms of Hormone Action (Biological Sciences 658)

Plant Biochemistry (Biological Sciences 648)

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. Evening prelims: Oct. 15 and Nov. 19. K. J. Niklas.
Introductory botany for those who plan to specialize in or use some aspect of the plant sciences. Emphasizes structure reproduction, and classification of angiosperms and the history of life on earth. Laboratory emphasizes development of skills in handling plant materials, including identification. First and second weeks of laboratory are field trips, starting with the first day of classes. *Those who register for an evening laboratory are still required to attend the afternoon field trips.*

242 Plant Physiology, Lectures Spring. 3 credits. Primarily for undergraduates in agricultural sciences. Prerequisites: one year of introductory biology and introductory chemistry; concurrent enrollment in Biological Sciences 244 or written permission of instructor required for undergraduates. May not be taken for credit after Biological Sciences 341, unless written permission is obtained from instructor.

Lecs, M W F 10:10. 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.

Lab, M T W or R 1:25–4:25; disc, M T W or R 12:20. Lab and disc must be on same day. C. Reiss.
Experiments exemplify concepts covered in Biological Sciences 242 and offer experience in a variety of biological and biochemical techniques, including use of radioisotopes.

246 Ethnobotany Spring. 3 credits. Limited to 20 students. Prerequisite: written permission of instructor.

Lecs, M W 8; lab, F 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.

247 Poisonous Plants Fall. 2 credits. S-U grades optional.

Lecs, T R 9:05. J. M. Kingsbury.
A discussion of incidence and conditions of poisoning in man and animals, poisonous principles from plants, and effects of toxic plants on vertebrates.

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 hormonal action; metabolism, including photosynthesis and respiration; and responses to gravity, light, photoperiod, and temperature.

342 Taxonomy of Cultivated Plants (also Floriculture and Ornamental Horticulture 342) Spring. 4 credits. Limited to 28 students. Prerequisite: one year of introductory biology or written permission of instructor. May not be taken for credit after Biological Sciences 343.

Lecs, M W 10:10; labs, M W 2–4:25. J. W. Ingram.
A study of ferns and seed plants, their relationships, and their classification into families and genera, emphasizing cultivated plants. Particular emphasis is placed on gaining proficiency in identifying and distinguishing families and in preparing and using analytical keys. Attention is also given to the economic importance of taxa, to the basic taxonomic literature, and to the elements of nomenclature.

343 Taxonomy of Vascular Plants Fall. 4 credits. Prerequisites: one year of introductory biology and written permission of instructor. May not be taken for credit after Biological Sciences 342.

Lecs and discs, T R 9:05; labs, T R 2–4:25. M. D. Whalen.
An introduction to the classification of ferns and flowering 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. Not intended for general education. Students in doubt about their level

of preparedness or the role of this course in their curricula are encouraged to consult the instructor before registering.

Lecs, T R 8; 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 Spring. 4 credits. Not offered 1981–82.

Lecs, M W F 10:10; lab, M W or F 2–4:25. J. M. Kingsbury.

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, T W or R 1:25–4:25; disc, T 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 radioisotopes.

[440 Plant Geography Spring. 2 credits.

Prerequisite: Biological Sciences 343 or equivalent. Recommended: Biological Sciences 463 or 477 or both. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1981–82; first offered spring 1983.

Lecs, T R 10:10. M. D. Whalen.

Patterns of distribution and variation of plant species and higher taxa; endemism and disjunction and their causes; influences of past continental movements and climatic change on plant distributions; geographical aspects of plant speciation; major biomes and floristic regions of the world; and methods of phytogeographic analysis.]

442 Biology of Plant Species Spring. 2 credits.

Prerequisite: Biological Sciences 343 or equivalent. Recommended: Biological Sciences 463 or 477 or both. S-U grades optional, with permission of instructor. Offered alternate years.

Lecs, T R 10:10. M. D. Whalen.

A comprehensive introduction to the nature and origin of plant species, with coverage of plant evolutionary genetics, race formation and modes of speciation, evolution of reproductive isolating mechanisms, types of species complexes found in plants, cytogenetic aspects of plant speciation, natural hybridization and its consequences, and the origin and nature of higher taxa.

[443 (442) Research Methods in Systematic Botany Fall. 2 credits. Limited to 10 students.

Prerequisite: Biological Sciences 343 or equivalent. Offered alternate years. Not offered 1981–82; first offered fall 1982.

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. Not offered 1981–82.

Lecs, T R 8; labs, T R 2–4:25. D. J. Paolillo.

The life histories of bryophytes, vascular cryptogams, 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 Engineering A&EP

601) Fall. 3 credits. Prerequisites: Chemistry 104 or 208; Mathematics 106, 111, or 113; and either Physics 102 or 208; or permission of instructor. Offered alternate years.

Lecs, M 1:25 and T R 10:10. R. K. Clayton.

A detailed study of the process by which plants use light in order to grow; physical and physicochemical aspects of the problem are emphasized.

[446 Cytogenetics Spring. 3 credits. Prerequisites: Biological Sciences 281 and 347, or their equivalents. Offered alternate years. Not offered 1981–82.

Lecs, M W 9:05; lab, M or W 10:10–12:35. C. H. Uhl.

Deals mainly with the cellular mechanisms of heredity, including recent research in cytology, cytogenetics, and cytotaxonomy.]

448 Plant Evolution and the Fossil Record

Spring. 3 credits. Prerequisite: Biological Sciences 241 or equivalent, or written permission of instructor. Offered alternate years.

Lecs, T R 9:05; lab, R 12:20–2:15. K. J. Niklas.

An introduction to evolution, surveying major changes in plants from the origin of life to the present. Emphasis is placed on plant form and function, adaptations to particular ecologic settings, and evolutionary theory as it relates to plants.

640 Applied Plant Anatomy Spring. 3 credits.

Prerequisites: Biological Sciences 345 or equivalent, and permission of instructor.

Lecs and discs, T R 9:05; lab, W 1:25–4:25.

N. W. Uhl.

The use of anatomy in vascular plants for diagnosis of structure, taxonomic relationships, evolutionary sequences, and ecological adaptations with emphasis on recent research. The laboratory provides experience in techniques and interpretation.

[642 Topics in Ultrastructure of Plant Cells

Spring. 3 credits. Primarily for graduate students, although upperclass students with adequate background are allowed to enroll. No auditors.

Prerequisites: Biological Sciences 345 or 347, and written permission of course coordinator. Offered alternate years. Not offered 1981–82.

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 doing work in plant physiology, but open to others if space permits. 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.

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.

Lec and disc, F 11:15. D. M. Bates.

The families of flowering plants encountered solely or chiefly in tropical regions are considered in lectures, discussions, and demonstrations, with the aim of providing basic points of recognition for, and an understanding of, diversity and relationships in these families for the student venturing into the tropics.

[646 Families of Tropical Flowering Plants: Field Laboratory Intersession. 3 credits. Limited to 20

students, with preference given to seniors and graduate students from member institutions of the Organization for Tropical Studies. Prerequisite: Biological Sciences 342 or 343 or equivalent.

Recommended: Biological Sciences 645. S-U grades only. For more details and application, contact the L. H. Bailey Hortorium, 467 Mann Library. Estimated cost of tuition plus room and board (exclusive of transportation), \$1,000. Offered alternate years. Not offered 1981–82.

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. M. Bates).

Lectures and discussions led by staff, visitors, and students on topics of current importance to systematic botany.

[648 Plant Biochemistry Spring. 3 credits.

Prerequisites: organic chemistry, biochemistry, and a course in plant physiology. Offered alternate years. Not offered 1981–82.

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 1981–82.

Lecs, M W F 10:10. R. M. Spanswick.

Transport of ions, water, and organic materials in plants; mechanisms of ion transport; relationships between ion transport and metabolism; ion uptake and transport in higher plants; phloem transport; and water relations of single cells and whole plants.]

[651 Quantitative Whole-Plant Physiology Fall. 3 credits. Prerequisites: introductory physics, calculus, and plant physiology. S-U grades only. Offered alternate years. Not offered 1981-82.

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 Spring. 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 Spring. 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. W. J. Dress.
An analysis of the International Code of Botanical Nomenclature and its application to various plant groups.

656 Topics in Paleobotany Spring. 1 credit. Prerequisite: Biological Sciences 448 or equivalent background in evolution, or written permission of instructor.

Lab and disc to be arranged. K. J. Niklas.
A series of selected topics designated to provide a background in plant evolution, paleobotanical literature, and evolutionary theory. Among the topics discussed are the origin of a terrestrial flora, the evolution of the seed plants, and the origin and adaptive radiation of the angiosperms.

657 Literature of Taxonomic Botany Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades optional. Offered alternate years.

Lec and disc, R 10:10. J. W. Ingram.
A survey of the basic reference works in taxonomy from the pre-Linnaean literature drawn on by Linnaeus to contemporary publications, with comments on the peculiarities of the books (when appropriate), publication dates, typographic devices, and intricacies of bibliographic citation.

740 Plant Biology Seminar Fall and spring. Noncredit (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

Advanced Mycology (Plant Pathology 709)

Current Topics in Mycology (Plant Pathology 649)

Field Phycology (Biological Sciences 441)

Introductory Mycology (Plant Pathology 309)

Plant Ecology (Biological Sciences 463, 465)

Plant Ecology Seminar (Biological Sciences 669)

Taxonomy of Fungi (Plant Pathology 729)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

Ecology, Systematics, and Evolution

260 Introductory Ecology Fall or spring. 3 credits. Prerequisite: one year of introductory biology or written permission of instructor. May not be taken for credit after Biological Sciences 360.

Lecs, T R 11:15; disc, T or R 1:25, 2:30, or 3:35.

Fall: S. J. Risch; spring: P. F. Brussard.
An introduction to biological phenomena that occur at the population, community, and ecosystem levels of organization. The relevance of ecological principles to current environmental problems is examined.

274 The Vertebrates Spring. 5 credits. Primarily for sophomores; this course is a prerequisite 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. 23. Staff.

An introduction to the evolution, classification, comparative anatomy, life history, and behavior of vertebrate animals. Laboratory dissection and demonstration are concerned with structure, classification, systematics, biology of species, and studies of selected aspects of vertebrate life.

360 General Ecology Fall or spring. 3 credits. For students concentrating in ecology or a related subject. Not open to freshmen in fall semester. Prerequisite: one year of introductory biology for majors. May not be taken for credit after Biological Sciences 260.

Lecs, T R 9:05; disc, W or R 1:25, 2:30, or 3:35. Fall: P. L. Marks, P. P. Feeny; spring: R. B. Root, B. F. Chabot.

Principles concerning the interactions between organisms and their environment; influence of competition, predation, and other factors on population size and dispersion; analysis of population structure and growth; processes of speciation; interspecific competition and the niche concept; succession and community concepts; influence of climate and past events on the diversity and stability of communities in different regions of the world; and role of energy flow and biogeochemical cycling in determining the structure and productivity of ecosystems. Modern evolutionary theory is stressed throughout and attention is given to conflicting ecological hypotheses.

371 Human Paleontology Fall. 4 credits. Prerequisite: one year of introductory biology or permission of instructor.

Lecs, M W F 2:30; lab, 1 hour each week, to be arranged; occasional field trips. K. A. R. Kennedy.
A broad survey of the fossil evidence for human evolution with special attention to skeletal and dental anatomy, geological contexts, paleoecology, dating methods, archaeological associations, and current theories of primate phylogeny.

455 Insect Ecology, Lectures (also Entomology

455) Fall. 2 credits. Prerequisites: Biological Sciences 360 and Entomology 212, or their

equivalents. Recommended: concurrent enrollment in Biological Sciences 457. Offered alternate years.

Lecs, W F 11:15. R. B. Root.
Ecological and evolutionary principles are integrated by thorough examination of outstanding investigations. Topics discussed include the factors responsible for the great diversity of insects, adaptive syndromes associated with climate, natural history of arthropod guilds, impact of insects on terrestrial vegetation, population regulation, and the contrast between natural and managed ecosystems.

457 Insect Ecology, Laboratory (also Entomology

457) Fall. 2 credits. Limited to 16 students. Prerequisite: concurrent enrollment in Biological Sciences 455. Offered alternate years.

Lab, W 1:25-4:25; plus F or S field trips to be arranged during the field season. R. B. Root.
Field exercises focus on insect natural history and methods of sampling populations. Laboratories devoted to rearing insects, estimating life-table parameters, and analyzing communities.

461 Oceanography Fall. 3 credits. Prerequisites: college physics and either Biological Sciences 260 or 360; 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. Field techniques and analytical methods are demonstrated.

462 Limnology, Lectures Spring. 3 credits.

Prerequisite: Biological Sciences 260 or 360, or written permission of instructor.

Lecs, M W F 11:15. G. E. Likens.
A study of the interaction of biological communities and their aquatic environment. The physical, chemical, and biological dynamics of freshwater ecosystems.

463 Plant Ecology, Lectures Fall. 3 credits.

Prerequisites: two advanced-level courses in biology, including Biological Sciences 360, or written permission of instructor. Recommended: some taxonomic familiarity with vascular plants and concurrent enrollment in Biological Sciences 465.

Lecs, M W F 11:15. P. L. Marks.
Principles of plant-environment interactions in relation to the evolution, distribution, structure, and functioning of plants and plant communities.

464 Limnology, Laboratory Spring. 2 credits.

Prerequisite: concurrent or previous enrollment in Biological Sciences 462.

Lab, T W R or F 1:25-4:25; 1 all-day, overnight field trip. G. E. Likens, W. R. Schaffner.
Field trips and laboratories devoted to studies of aquatic ecosystems.

465 Plant Ecology, Laboratory Fall. 1 credit.

Prerequisite: concurrent enrollment in Biological Sciences 463 or equivalent background in plant ecology.

Lab, F 12:05-5. P. L. Marks.
Laboratory and field exercises in plant ecology. Field studies of plant communities and techniques for the analysis of community data are emphasized.

468 Systems Ecology Spring. 4 credits.

Prerequisites: Biological Sciences 360 and calculus. Recommended: Computer Science 102. S-U grades optional.

Lecs, M W F 10:10; disc, T or R 2:30-4:05. 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. Topics covered include relevant

ecological principles, system diagramming, rudimentary mathematical techniques, simulation modeling, and the use of analog and digital computers. Format includes student presentations and guest lectures describing individual case histories in which a variety of methods were used for ecological analysis, simulation, or prediction. Each student is required to develop an original computer model.

[470 Undergraduate Ecology Seminar] Fall or spring. 1 or 2 credits. May be repeated for credit. From time to time different seminars are offered. Not offered 1981–82.]

471 Mammalogy Fall. 4 credits. Recommended: Biological Sciences 274. S-U grades optional, with permission of instructor. Offered alternate years. Fee, \$15.

Lecs, M W F 9:05; lab, M or T 1:25–4:25; 1 weekend field trip required. P. J. Parker. Lectures on the evolution, classification, distribution, and adaptations of mammals. Laboratory and fieldwork on systematics, ecology, and natural history of mammals of the world, with primary emphasis on the North American fauna. Systematics laboratories held in the museum at Research Park.

472 Herpetology Fall. 4 credits. Recommended: Biological Sciences 274. S-U grades optional, with permission of instructor. Offered alternate years. Fee, \$5.

Lecs and labs, T R 12:20–4:25; occasional field trips and special projects. F. H. Pough. Lectures cover various aspects of the biology of amphibians and reptiles, including evolution, zoogeography, ecology, behavior, and physiology. Laboratory includes systematics, functional morphology, and behavior.

474 Laboratory and Field Methods in Biological Anthropology Spring. 4 credits. Prerequisite: one year of introductory biology or permission of instructor.

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 upon comparative primate anatomy, the human paleontological record, description of skeletal and living subjects, paleopathology, skeletal maturation, and relevant field techniques for the archaeologist.

475 Ornithology Fall. 4 credits. Recommended: Biological Sciences 274. S-U grades optional, with permission of instructor. Offered fall 1981, fall 1982, and alternate fall terms thereafter.

Lecs and labs, T R 12:20–4:25; occasional field trips and special projects. T. J. Cade. Lectures cover various aspects of the biology of birds, including anatomy, physiology, classification, evolution, migration and orientation, behavior, ecology, and distribution, and are fully integrated with laboratory studies. Laboratory includes studies of external and internal morphology, pterylosis, molts and plumages, specimen identification of birds of New York, and families of birds of the world. Several demonstration periods emphasize hybridization, evolution, adaptive radiation, mimicry, and geographic variation.

[476 Biology of Fishes] Fall. 4 credits. Prerequisite: Biological Sciences 274, or equivalent experience in vertebrate zoology with written permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1981–82.

Lecs, M W F 9:05; lab to be arranged. E. B. Brothers. An introduction to the study of fishes: their structure, classification, evolution, distribution, ecology, physiology, and behavior.]

477 Organic Evolution Fall. 4 credits.

Prerequisite: Biological Sciences 281 or permission of instructor. Recommended: Biological Sciences 260 or 360.

Lecs, T R 11:15; lec or disc, R 12:20; optional sessions to be arranged. P. F. Brussard. Lectures and class discussions on organic evolution, including the origin of life, genetic mechanisms, the properties of populations, the ways in which adaptation and speciation occur, and the resultant major patterns of organic diversity.

[478 Biology of Fishes, Laboratory] Fall. 1 credit. Limited to 15 students. Prerequisite: concurrent enrollment in Biological Sciences 476. Offered alternate years. Not offered 1981–82.

Lab, M 1:25–4:25; plus irregular hours as required for experiments and some required field trips. E. B. Brothers.

Laboratory and fieldwork on structure, identification, ecology, physiology, and behavior of fishes, with emphasis on local species.]

479 Physical Anthropology: History and Theory Fall. 2 credits. Prerequisite: one year of introductory biology or permission of instructor.

Sem, W 7:30–9:30 p.m. K. A. R. Kennedy. The historical background of present-day concepts of man's evolutionary variations and adaptations in space and time is surveyed. The formation of biological anthropology as an area of scientific inquiry within the social sciences is reviewed.

660 Field Studies in Ecology and Systematics

Fall or spring. 2 credits. Prerequisites: Biological Sciences 260 or 360, a taxon-oriented course, and permission of instructor. Estimated cost of room and board (exclusive of transportation), to be announced.

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 either during 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.

[662 Mathematical Ecology (also Statistics and Biometry 662)] Spring. 3 credits. Prerequisites: one

year of calculus and a course in statistics. Recommended: a general ecology course. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1981–82.

Lecs, M W F 12:20. 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, simulation, and analytical techniques.]

[664 Seminar in Coevolution between Insects and Plants (also Entomology 664)] Spring. 2 credits.

Intended for seniors and graduate students. Limited to 15 students. Prerequisites: courses in entomology, ecology, evolution, and organic chemistry, and written permission of instructor. S-U grades optional. Offered alternate years. Not offered 1981–82.

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. G. E. Likens. A seminar course on advanced limnological topics.

666 Marine Ecology Spring. 3 credits.

Prerequisite: Biological Sciences 260 or 360, or written permission of instructor. Recommended: Biological Sciences 461. S-U grades optional.

Lecs, M W F 9:05. J. P. Barlow. An introduction to biological oceanography, including adaptation of organisms to marine environments, organization of pelagic and benthic communities, and dynamics of marine ecosystems, with some special consideration of current research in coastal and estuarine regions.

[667 Topics in Theoretical Ecology] Fall. 3 credits.

Primarily for graduate students; permission of instructor required for undergraduates. Prerequisite: one year of calculus. Recommended: Biological Sciences 662. S-U grades optional. Offered alternate years. Not offered 1981–82.

Lecs, 3 hours each week, to be arranged. S. A. Levin.

Current and classical theoretical issues in ecology and evolutionary biology. Biological issues are emphasized, although mathematical models are utilized throughout as tools to address those issues. Lectures cover both standard material and current journal articles.]

[668 Physiological Ecology of Phytoplankton]

Spring. 2 credits. Prerequisites: Biological Sciences 360 and Agronomy 410; or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1981–82.

Lecs and discs, 4 hours alternate weeks, to be arranged. G-Y. Rhee. Ecological observations in nature interpreted with respect to the findings of algal culture studies. Emphasis is placed upon photosynthesis, nutrient limitation, temperature, irradiance, diel periodicity, and other physiological and environmental variables. The theory and use of various culture methods are also emphasized.]

[669 Plant Ecology Seminar] Fall. 1 credit. May be repeated for credit. Suggested for students majoring or minoring in plant ecology. S-U grades optional. Not offered 1981–82.

Sem to be arranged. B. F. Chabot, 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.

Sem to be arranged. Vertebrate biology staff. Seminar presentations and discussions by students on areas of current research in vertebrate biology. Topics vary from semester to semester.

[679 Ichthyology] Fall. 5 credits. Enrollment limited.

Prerequisites: Biological Sciences 476 and 478; or written permission of instructor. Offered alternate years. Not offered 1981–82.

Lecs, M W 10:10; labs, W F 1:25–5; plus irregular hours as required for experiments and some required field trips. Independent research project or term paper required. E. B. Brothers. Lectures on advanced topics in fish biology, including systematics, ecology, behavior, life history, and literature. Laboratory studies of the orders, major families, and principal genera and of systematic procedures. Field studies of the ecology and life history of local species.]

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 Fall. 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 Fall. 3 or 4 credits (4 credits with term paper). Offered alternate years.

Lecs M W F 9:05. B. F. Chabot and staff.

Comparison of the responses and adaptations of organisms to environment in selected ecosystems. Emphasis on similarities and differences in molecular and organismal mechanisms by which plants and animals cope with their environments.

766 Population Ecology Spring. 3 or 4 credits (4 credits with term paper). Prerequisite: graduate standing with some background in calculus, statistics, ecology, and evolutionary theory; or written permission of instructor. Offered alternate years.

Lecs and discs, M W F 9:05. P. F. Brussard and staff.

Critical examination of the properties and dynamics of populations. Emphasis on theories of population structure, dynamics, and regulation. Discussion of experimental approaches to analyses of natural populations.

[767 Community Ecology] Fall. 3 or 4 credits (4 credits with term paper). Prerequisite: Biological Sciences 360 or equivalent, or written permission of instructor. Offered alternate years. Not offered 1981–82.

Lecs, T R 10:10–12:05. Staff.

The structure and dynamics of natural communities; patterning and sampling problems; species diversity; niches and gradient relations; and ordination, classification, succession, climax, and disturbance. Comparative aspects of terrestrial, marine, and freshwater communities are stressed.]

[768 Ecosystems] Spring. 3 or 4 credits (4 credits with term paper). Prerequisite: Biological Sciences 360 or equivalent, or written permission of instructor. Offered alternate years. Not offered 1981–82.

Lecs, T R 10:10–12:05. G. E. Likens and staff. Analysis of ecosystems in terms of energy flow, biogeochemistry, and model systems. Emphasis on the functional properties of ecosystems, from simple systems to the biosphere as a whole.]

Population Biology of Health and Disease (Veterinary Medicine 330) Spring. 3 or 4 credits (4 credits with either lab exercises or library research).

Lecs, T R 11:15; disc and demonstration, T 2–3:30. J. H. Whitlock and staff.

An integrative study of the problems of health and disease in populations of humans, plants, and animals. Examples are drawn from the whole symbiotic spectrum. Parasitoses that result in disease are demonstrated to have comparable structures and functions. These structures and functions are examined as adaptive phenomena from ecological, genetic, sociological, and economic points of view. In the demonstrations, specific diseases or symbioses are presented for discussion either through the medium of motion pictures or by specialists (such as epidemiologists, virologists, plant nematologists, and insect pathologists) from the Cornell staff.

Related Courses in Other Departments

Advanced Insect Taxonomy (Entomology 631, 632, 633, 634)

Advanced Soil Microbiology (Agronomy 606)

Advanced Work in Animal Parasitology (Veterinary Medicine 737)

Biology of Plant Species (Biological Sciences 442)

Ecological Animal Physiology (Biological Sciences 315, 317)

Ecology and Systematics of Freshwater Invertebrates (Entomology 471)

Insect Biology (Entomology 212)

Insect Pathology (Entomology 453)

Introductory Insect Taxonomy (Entomology 331)

Invertebrate Zoology (Biological Sciences 212)

Marine Sciences (Biological Sciences 363–370, 467, 473)

Microbial Ecology (Agronomy 410 and Microbiology 424)

Parasitic Helminthology (Veterinary Medicine 440)

Phycology (Biological Sciences 348)

Plant Geography (Biological Sciences 440)

Soil Microbiology (Agronomy 406)

Taxonomy of Vascular Plants (Biological Sciences 343)

Teaching Experience (Biological Sciences 498)

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. Prerequisite: one year of introductory biology or equivalent. Students who have taken Biological Sciences 282 may register only with written permission of instructor. No admittance after first week of classes.

Lecs, T R 10:10–12:05; lab, M T W or R 2:30–4:25; additional hours to be arranged. Lab sections may also be scheduled T or R 8–9:55, W or F 10:10–12:05, F 2:30–4:25, or S 10:10–12:05, if enrollment requires it. Students do not choose lab sections during course enrollment; lab assignments are made during first day of classes. Fall:

R. J. MacIntyre; spring: T. D. Fox; lab: P. J. Bruns.

A general study of the fundamental principles of genetics in eucaryotes and procaryotes. Discussions of gene transmission, gene action and interaction, gene linkage and recombination, gene structure, gene and chromosome mutations, genetic aspects of differentiation, genes in populations, breeding systems, and extrachromosomal inheritance. In the laboratory students perform experiments with microorganisms and conduct an independent study of inheritance in *Drosophila*.

282 Human Genetics Spring. 3 credits. Each disc section limited to 25 students. Prerequisite: one year of introductory biology or equivalent. Students who have taken Biological Sciences 281 may register only with written permission of instructor.

Lecs, M W 10:10; disc, R or F 10:10 or 11:15 (1 disc section R 10:10, 2 sections R 11:15, 4 sections F 10:10, and 1 section F 11:15). A. M. Srb.

An introduction to biological heredity through consideration of human genetics. Advances in the science of genetics are having a profound effect on our understanding of ourselves and on our potential for influencing our present and future well-being. The course is intended primarily to contribute to the student's general education in these matters. Although certain aspects of genetics are considered with some rigor, the course is not designed to serve as a prerequisite to advanced courses in genetics.

385 Developmental Biology Fall. 3 credits.

Prerequisite: Biological Sciences 281.

Lecs, M W F 11:15. A. W. Blackler.

Morphogenetic, cellular, and genetic aspects of the developmental biology of animals.

[389 Embryology] Fall; also offered during the 6-week summer session in odd-numbered years. 4 credits. Prerequisite: one year of introductory biology. Offered alternate years. Not offered 1981–82.

Lecs, M W 11:15; labs, M W 2–4:25. A. W. Blackler.

A course in the embryonic development of animals, with emphasis directed to the vertebrate groups and to the comparative aspects of morphogenesis and function. Invertebrate material is used on occasion to illustrate embryological principles. The laboratory has a strong morphogenetic theme, and stresses the comparative aspects of developmental anatomy.]

[480 Seminar in Developmental Biology] Spring, weeks 1–7. 1 credit; may be repeated for credit.

Limited to upperclass students. S-U grades only. Not offered 1981–82. Sem to be arranged. Staff (coordinator: A. W. Blackler).]

[481 Population Genetics] Fall. 3 credits.

Prerequisite: Biological Sciences 281 or equivalent. S-U grades optional. Not offered 1981–82.

Lecs, M W 10:10. Staff.

A study of factors that influence the genetic structure of Mendelian populations and that are involved in race formation and speciation. Four quizzes and an optional term paper determine the final grade.]

483 Molecular Aspects of Development Spring. 3 credits. Prerequisite: Biological Sciences 330 or 331. Offered alternate years.

Lecs, M W F 11:15. Staff.

An examination of the molecular biology of developing systems. Emphasis on understanding the mechanisms involved in gene expression in developing systems, both at the transcription and translation levels. Specific topics include regulation of RNA synthesis and utilization, nucleo-cytoplasmic interactions, and induction of cell-specific protein synthesis. Examples are discussed from both higher and lower eucaryotic systems.

484 Molecular Evolution Spring. 3 credits.

Prerequisites: Biological Sciences 281 and organic chemistry. Offered alternate years.

Lecs, T R 11:15. R. J. MacIntyre.

An analysis of evolutionary changes in proteins and nucleic acids, and gene-enzyme variability in natural populations. The role of natural selection in effecting these changes and maintaining genetic variation at the molecular level is critically examined. Theories on the evolution of the genetic code and the construction of phylogenetic trees from biochemical data are discussed.

485 Microbial Genetics, Lectures Fall. 2 credits.

Limited to upperclass and graduate students.

Prerequisites: Biological Sciences 281 and Microbiology 290; or written permission of instructor. S-U grades optional.

Lec, W 7:30–9:25 p.m. S. A. Zahler.

Genetics of bacteria and their viruses, with emphasis on the mechanisms of genetic phenomena.

486 Immunogenetics (also Animal Science 486)

Spring. 4 credits. Enrollment limited. Prerequisites: Biological Sciences 281 or Animal Science 221, and a course in immunology or permission of instructor.

Lecs, M W F 10:10; disc, W or R 12:20.

R. R. 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 20 students. Prerequisites: concurrent or previous enrollment in Biological Sciences 485, Microbiology 291 or equivalent, and written permission of instructor.

Lab, T 1:25–4:25; additional hours to be arranged. S. A. Zahler.
Problem solving in bacterial genetics.

780 Current Topics in Genetics Fall or spring. 2 credits. May be repeated for credit. Primarily for graduate students, with preference given to majors in the Field of Genetics; written permission of instructor required for undergraduates. Limited to 20 students. No auditors. S-U grades optional, with permission of instructor.

Sem to be arranged. Staff.
A seminar course with critical presentation and discussion by students of original research papers in a particular area of current interest. Content of the course and staff direction varies from term to term and will be 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 732–738)

Cytogenetics (Biological Sciences 446)

Cytology (Biological Sciences 347)

Invertebrate Embryology (Biological Sciences 482)

Organic Evolution (Biological Sciences 477)

Physiological Genetics of Crop Plants (Plant Breeding 605)

Plant Growth and Development (Biological Sciences 644)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

Neurobiology and Behavior

321 Neurobiology and Behavior Fall. 3 credits. Prerequisite: one year of introductory biology. S-U grades optional, with permission of instructor.

Lecs, M W F 12:20. Evening prelims: Oct. 13 and Nov. 17. S. T. Emlen, R. R. Capranica, and staff.
A general introduction to the field of neurobiology and behavior. Topics include evolution of behavior, cueing of behavior, animal orientation, social and nonsocial behavior, neuroanatomy, neurophysiology, neurochemistry, neural networks, 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 321 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) Spring. 3 credits. Limited to 25 upperclass students. Prerequisites: laboratory experience in biology or psychology, Biological Sciences 321 or Psychology 123, and permission of instructor. S-U grades optional.

Labs, T R 1:25–4:25. Staff.
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 Engineering A&EP 611)] Fall. 3 credits. Prerequisites: Chemistry 104 or 208; Mathematics 106, 111, or 113; and either Physics 102 or 208; or permission of instructor. Offered alternate years. Not offered 1981–82.

Lecs, M 1:25 and T R 10:10. R. K. Clayton.
A study of the mechanism of seeing that includes biological, physical, and chemical approaches to the subject.]

[396 Introduction to Sensory Systems (also Psychology 396)] Spring. 3 credits. No auditors. Prerequisites: an introductory course in biology or biopsychology, and a second course in neurobiology and 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 1981–82; next offered spring 1983 and each spring term thereafter.

Lecs, T R 9:05; disc to be arranged. B. P. Halpern.
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 are studied. The principles and limitations of major methods used to examine sensory systems are considered. Behavioral (including psychophysical, biophysical, and neurophysiological) and anatomical methods are usually included. The course is taught using the Socratic method, in which the instructor asks questions of the students.]

420 Seminar in Neurobiology and Behavior Fall or spring. Variable credit. May be repeated for credit. Primarily for undergraduates. S-U grades optional.

Sem to be arranged. Organizational meetings first W of each semester at 8 p.m. in Caldwell 100. Staff.
In most semesters, at least two seminars on different topics are offered. Topics and instructors are listed in the division's catalog supplement issued at the beginning of the semester.

421 Comparative Vertebrate Ethology Fall; also offered during the 3-week summer session. 3 credits. Prerequisites: one year of introductory biology for majors, Biological Sciences 321, and permission of instructor. S-U grades optional.

Lecs, T R 9:05; lab to be arranged. Independent research project required. W. C. Dilger.
A survey of the methods and principles of vertebrate ethology, including such topics as aggression, fear, sex, feeding, and other normal activities. Emphasis is placed on the causation, function, biological significance, and evolution of species-typical behavior. The laboratories are designed to give firsthand knowledge of the material covered in lectures. During the summer, field trips and field projects are substituted for many of the laboratories.

[423 Animal Communication] Fall. 4 credits. Limited to 32 students. Prerequisites: Biological Sciences 321 and either Physics 102 or 208. Offered alternate years. Not offered 1981–82.

Lecs, T R 10:10; lab, T or R 1:25–4:25; other meetings to be arranged. R. R. Capranica, R. R. Hoy.

The functional aspects of biological signals, their physical properties, and the physiological mechanisms underlying their generation and reception. Lectures examine in detail selected

biological communication problems from each of the known sensory modalities. Discussion covers signal analysis, transmission properties, and the limitations of each type of communication. Laboratories include behavioral observations under both field and captive conditions, and individual experience with the techniques of signal recording and analysis.]

424 Animal Social Behavior Spring. 3 credits. May be repeated for credit with permission of instructor. Prerequisite: Biological Sciences 321. S-U grades optional.

Lecs, T R 10:10–11:30. G. Hausfater.
This course examines animal social behavior and social organization in a phylogenetic perspective. A different taxonomic group serves as the focus of the course each year.

425 (628) Field Studies of Animal Behavior Fall. 4 credits. Limited to 12 students. Prerequisites: Biological Sciences 321 and written permission of instructor. Recommended: concurrent or previous enrollment in Biological Sciences 421 or 427. S-U grades optional. Fee, \$15.

Lec, T 9:05; lab and disc, R 1:25–4:25; Saturday field trips during the field season; 2 weekend field trips and occasional evening meetings. Enrolled students must participate in all aspects of the course; no partial credit given. P. W. Sherman.
A course for juniors, seniors, and first-year graduate students interested in field research on animal behavior. Lecture-discussion areas include design of field experiments, hypothesis testing, data analysis, and current topics in evolutionary ecology and behavior. Laboratory field sessions acquaint students with observation techniques; research methods; and the behavioral biology of plants, insects, fishes, amphibians, birds, and mammals of upstate New York.

427 Vertebrate Social Behavior Spring. 3 credits. Prerequisites: Biological Sciences 321, and 260 or 360. S-U grades optional, with permission of instructor. Offered alternate years. Offered spring 1982; next offered fall 1983 and alternate fall terms thereafter.

Lecs, M W F 10:10; disc to be arranged. S. T. Emlen.
The study of the adaptive bases of social behavior is examined. The first half of the course deals with ecological sociobiology: the effects of ecological constraints of resource dispersion and predation pressures upon the structure of animal societies; the adaptiveness of territoriality and coloniality; the evolution of cooperative and communal social systems; and the functioning of monogamous, polygamous, and promiscuous mating systems. The second half of the course emphasizes genetic sociobiology: the predictions from individual and kin-selection theory for various types of social interactions, e.g., female choice during mate selection; the role of the male in parental care; parent-offspring conflict; behavioral nepotism; and the evolution of phenotypic altruism. Finally, the course examines the impact of the emerging field of sociobiology upon its sister biological and social sciences.

491 Principles of Neurobiology, Laboratory (also Psychology 491) Fall. 4 credits. Limited to 24 students. Prerequisite: Biological Sciences 396 or 496, or written permission of instructor.

Labs, M W or T R 12:20–4:25; additional hours to be arranged. B. R. Land and staff.
Laboratory practice with neurobiological preparations and experiments, designed to teach the techniques, experimental designs, and research strategies used to study biophysical and biochemical properties of excitable membranes, sensory receptors, and the central nervous system transformation of afferent activity, as well as the characteristic composition and metabolism of neural tissue. Theoretical content at the level of *Aidley's The Physiology of Excitable Cells*.

[494 Neuropharmacology] Spring. 3 credits. Prerequisites: Biological Sciences 321 and either 330 or 331, or written permission of instructor. Not offered 1981–82.

Lecs, M W F 8. Staff.

Deals with drugs that affect the nervous system, both central and peripheral. Emphasis is on mechanisms of drug action whereby basic biochemical processes and neurophysiological and behavioral phenomena are bridged. Stimulants, anesthetics, hallucinogens, and neurotoxins are discussed, as well as drug addiction, psychopharmacology, endocrine pharmacology, and the biochemical basis of the therapeutic uses of drugs in diseases of the nervous system.]

496 Cellular Neurobiology Spring. 4 credits. Prerequisite: Biological Sciences 321.

Lecs, M W F 10:10; disc to be arranged.

R. B. Campenot, R. M. Harris-Warrick, R. R. Hoy. A one-semester, intensive undergraduate course in neurobiology. The course provides in-depth, current treatment of the basic principles of cellular, chemical, pharmacological, molecular, anatomical, and integrative aspects of neurobiology.

[497 Neurochemistry] Fall. 3 credits. Limited to 30 students. Prerequisites: Biological Sciences 496 and either 330 or 331, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1981–82.

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 neurological disorders are described. Readings are primarily from journal articles.]

623 Chemical Communication (also Chemistry 622) Fall. 3 credits. Primarily for research-oriented students. Limited to 30 senior and graduate students. Prerequisites: one year of introductory biology for majors or equivalent, course work in biochemistry, and Chemistry 358 or equivalent. Offered alternate years.

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 321 and 281. Recommended: course work in developmental biology. S-U grades optional. Offered alternate years. Not offered 1981–82.

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.]

627 Quantitative Approaches to Animal Behavior Spring. 3 credits. Primarily for graduate students; written permission of instructor required for undergraduates. Enrollment limited. Prerequisite: Biological Sciences 321 or equivalent. S-U grades optional, with permission of instructor. Offered alternate years.

Lecs and discs, T R 10:10–11:30. G. Hausfater. This course emphasizes a quantitative approach to research on animal behavior. Lectures, discussions, and readings focus on the formulation of precise,

testable hypotheses for behavior research, especially mathematical models, and on the use of systematic sampling techniques in observational research. Basic probability distributions are introduced and used in the analysis of behavior sequences and interaction patterns. Stochastic models of behavior are also discussed.

[691 Developmental Neurobiology] Fall. 2 credits. Prerequisite: Biological Sciences 496 or permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1981–82.

Lecs and discs, 2 hours each week, 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, i.e., How do nerve cells differentiate both morphologically and biochemically, and how do they interact to produce a properly wired nervous system?]

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.

Lecs, T R 9:05; lab, R 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.

[696 Neuroelectric Systems (also Electrical Engineering 622)] Spring. 3 or 4 credits (4 credits with lab). Prerequisite: either Biological Sciences 423 or 496 or Electrical Engineering 301 or 621; written permission of instructor required for lab. Offered alternate years. Not offered 1981–82.

Lecs, M W 9:05; disc and demonstration to be arranged; lab to be arranged. R. R. Capranica, M. Kim.

Application of microprocessors for neuroelectric data acquisition and systems analysis. Lectures cover electrical activity of single nerve cells, electrodes and instrumentation techniques, analysis of electrophysiological data, and coding principles in the nervous system, as well as appropriate background material for the use of microprocessors in neurobiology. Laboratory exercises provide experience in the actual use of microprocessors.]

698 Neuroethology Spring. 4 credits.

Prerequisites: Biological Sciences 321 and 496, or their equivalents; or permission of instructor. Offered alternate years.

Lecs, T R 9:05; discs, 2–3 hours each week to be arranged. J. M. Camhi.

The mechanisms through which the natural behavior of animals is produced by the nervous system. Topics include principles of ethology, visual worlds and behavior, auditory worlds and behavior, principles of feature detection, central commands for movement, organization of rhythmic behaviors, feedback control of behavior, and plasticity in the nervous system and behavior. Discussions cover these topics in greater detail. To prepare for the discussions, students are required to read several research papers each week.

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.

[723 Graduate Seminar in Vertebrate Social Behavior] Fall. 2 credits; may be repeated for credit. Enrollment limited. Prerequisites: Biological Sciences 321, 360, and 477, or their equivalents, and written permission of instructor. S-U grades only. Not offered 1981–82.

Sem to be arranged. S. T. Emlen, G. Hausfater. Intended as a graduate-level follow-up to Biological Sciences 424 and 427. An advanced, participation-format seminar dealing with various aspects of the evolution of social organization in vertebrates.]

Related Courses in Other Departments

Biochemistry and Human Behavior (Psychology 361 and Nutritional Sciences 361)

Mammalian Neurophysiology (Biological Sciences 610)

Teaching Experience (Biological Sciences 498)

Undergraduate Research in Biology (Biological Sciences 499)

Courses in Marine Sciences

Although there is no concentration in marine sciences offered to Cornell undergraduates, there is extensive opportunity to prepare for more advanced study at the graduate level. Students interested in the marine sciences may enroll in courses offered at Cornell's Shoals Marine Laboratory (SML), a seasonal field station located on 95-acre Appledore Island six miles off the Maine and New Hampshire coasts.

The Ithaca campus functions of 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 16-credit program offered in cooperation with the Sea Education Association.

The following marine sciences courses are currently administered by the Cornell Marine Programs Office.

312 Anatomy and Behavior of the Gull Summer. 2 credits. Prerequisite: one year of introductory college biology. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$565.

Daily lec, lec-demonstrations, and labs for 2 weeks. SML faculty.

The gull has been a major subject in the study of animal behavior. In this course the functional anatomy of all gull organ systems is considered and demonstrated, with emphasis on sensory, nervous, digestive, and respiratory systems. The large nesting colonies of two species of gulls on Appledore Island are used to demonstrate territoriality, aggression, mating, and other basic patterns of gull behavior.

363 Field Marine Science for Teachers Summer. 1 credit. Primarily for teachers, grades 6 through 12, but open to others. Prerequisite: one year of introductory college biology. S-U grades optional. A special 10-day course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$420.

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, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$1,065.

Daily lecs, labs, and fieldwork for 4 weeks. 3 core faculty assisted by up to 15 visiting lecturers, including representatives of government agencies and commercial fishermen. SML faculty.
Designed for the student who desires an initial overview of the marine sciences, this course emphasizes living material in natural habitats. Most of the course work is concerned with the biology of intertidal plants and animals, biological oceanography, ichthyology, and fisheries. Attention also is given to introductory physical and chemical oceanography and marine geology. Marine ecology and the effects of human activity on the marine environment are included.

365 Underwater Research Summer. 2 credits. Prerequisites: recognized scuba certification and a medical examination. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, ferry transportation, and compressed air supply), \$655.

Daily lecs and fieldwork for 2 weeks. Team-taught by a diving safety officer, a faculty member, and guest lecturers.

For competent divers only. Covers special problems of research underwater, 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 Shoals Marine Laboratory 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 every 2 months throughout the year.* Students spend the first half of SEA Semester (the 6-week basic shore component) in Woods Hole, Mass., receiving instruction in the marine and nautical sciences and studying our relationship with the sea. The second half of SEA Semester (the 6-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 applications, consult the Shoals Marine Laboratory office, Stimson G14. Program costs to be paid in place of regular Cornell tuition and fees: tuition for entire 16-credit SEA Semester, about \$3,700; room and board for sea component (6 weeks) only, about \$400.

Instructors for the SEA Semester include faculty of the SEA, Cornell, Woods Hole Oceanographic Institution, Boston University, and others.

Basic Shore Component (6 weeks)

366 SEA Introduction to Marine Science

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 are encouraged to develop individual projects to be carried out at sea.

367 SEA Man and the Sea 2 credits. Prerequisite: concurrent enrollment in Biological Sciences 366 and 368.

An interdisciplinary consideration of our relationship with the marine environment. Included are the political, economic, social, and cultural results of our use of the sea for recreation, scientific research, food, fuel, minerals, and energy-efficient transportation. Covers the elements of maritime history, law, literature, and art necessary to appreciate our marine heritage and to understand contemporary maritime affairs. Examples of mariners' journals are studied in preparation for the diary required of each student at sea.

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 ship management are taught from their bases in physics and astronomy. Provides the theoretical foundation for the navigation, seamanship, and engineering that the student will employ at sea.

Sea Component (6 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 34. The professional staff of 9 includes the captain, 3 science watch officers, 3 deck watch officers, an engineer, and a steward. In addition, 1 or more visiting investigators are frequently aboard. Up to 25 students round out the complement.

369 SEA Marine Science Laboratory

4 credits. Prerequisite: Biological Sciences 366. The practice of oceanography at sea. The student is introduced to the oceanic environment, including its biological, physical, chemical, and geological aspects; is instructed in the operation of oceanographic equipment through the taking of samples and measurements; and practices reducing and analyzing data and solving simple problems related to the surrounding oceanic environment. Topics vary with the cruise track but include attention to all of the major subdisciplines of oceanography.

370 SEA Nautical Science Laboratory 4 credits. Prerequisite: Biological Sciences 368.

The practice of nautical science at sea. The student is introduced to the technical and psychological problems of operation and existence in the physical environment of the ocean. Instruction and practice are provided in navigation, seamanship, marine engineering, and shipboard operations. Daily lectures build on the theoretical foundation established by the shore course and deal with the practical problems and applications presented by ship operation. During the final two weeks at sea, each student is expected to demonstrate, in succession, competence as navigator, deck watch officer and engineering watch officer.

413 Adaptations of Marine Organisms

Summer. 4 credits. Prerequisite: Biological Sciences 364 or 315 or a course in physiological ecology. S-U grades optional. A special 3-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$825.

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 (346) Field Phycology

Summer. 4 credits. Prerequisite: Biological Sciences 364 or general familiarity with marine algae. S-U grades optional. A special 3-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$825.

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 utilization. Laboratories and fieldwork emphasize relationships between distribution and major environmental parameters and involve student projects.

467 (362) Chemical Oceanography in the Field

Summer. 4 credits. Prerequisites: one year of introductory college chemistry and an introductory marine science course at the college level. S-U grades optional. A special 3-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$825.

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 CO₂, nutrients, organic material, and suspended materials in coastal waters, with some work on the analysis of coastal sediments.

473 Topics in Marine Vertebrates Summer 4 credits. Prerequisite: Biological Sciences 364 or 274 or a course in vertebrate biology. S-U grades optional. A special 3-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$825.

Daily lec's, 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 (384) Invertebrate Embryology Summer. 4 credits. Prerequisite: Biological Sciences 364 or a course in invertebrate zoology. S-U grades optional. A special 3-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$825.

Daily lec's, labs, and fieldwork for 3 weeks. SML faculty.
A laboratory-oriented course emphasizing processes of fertilization and early development through the metamorphosis of larvae in species selected from an extensive variety of local marine invertebrates. Practical experience includes collecting specimens intertidally and from the plankton, culturing embryos through metamorphosis, camera lucida and photomicrographic recording of embryonic development, and design and execution of basic experiments on eggs and embryos. Lectures complement laboratory work through phylogenetic examination of classical invertebrate embryology and modern experimental developmental biology.

Coastal and Oceanic Law and Policy (Natural Resources 306) Summer. 1 credit. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$290.

Daily lec's and discs for 1 week. SML faculty.
Intended for persons interested in careers in management of marine or coastal resources or in the natural sciences. Subjects include law and policy related to ocean dumping, marine sanctuaries, environmental impact statements, water and air pollution, fisheries management, offshore gas and oil production, and territorial jurisdiction. Lectures on the status and history of the law are accompanied by discussion of relevant policy and analysis of the efficacy of various legal techniques. A case study that requires extensive use of the laboratory's library and personnel is assigned. The week concludes with a mock hearing.

Wetland Resources (Natural Resources 417) Summer. 1 credit. Prerequisite: one year of college biology. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$310.

Daily lec's, 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.

Introduction to Marine Pollution and Its Control Summer. 2 credits. Prerequisite: Biological Sciences 364 or permission of instructor. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and application, consult the SML office, Stimson G14. Estimated cost (includes tuition, room and board, and ferry transportation), \$565.

Daily lec's, 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.

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:

Animal Communication (Biological Sciences 423)

Bioenergetics and Membranes (Biological Sciences 632)

Biomechanical Systems—Analysis and Design (Engineering M&AE 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)

Membrane Biophysics (Engineering A&EP 615)

Modern Physical Methods in Macromolecular Structure Determination (Engineering A&EP 616)

Neuroelectric Systems (Biological Sciences 696 and Electrical Engineering 622)

Photosynthesis (Biological Sciences 445 and Engineering A&EP 601)

Physical Chemistry of Proteins (Chemistry 686)

Physics of Macromolecules (Physics 464)

Principles of Neurobiology, Laboratory (Biological Sciences and Psychology 491)

Protein Structure and Function (Biological Sciences 631)

Special Topics in Biophysical and Bioorganic Chemistry (Chemistry 782)

Special Topics in Biophysics (Engineering A&EP 614)

The Physics of Life (Engineering A&EP 206)

Transport of Solutes and Water in Plants (Biological Sciences 649)

Vision (Biological Sciences 395 and Engineering A&EP 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. Asst. Prof., Physiology/Veterinary Physiology†
Brothers, Edward B., Ph.D., U. of California at San Diego. Asst. Prof., Ecology and Systematics
Bruns, Peter J., Ph.D., U. of Illinois. Assoc. 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
Camhi, Jeffrey M., Ph.D., Harvard U. Prof., Neurobiology and Behavior
Clayton, Roderick K., Ph.D., California Inst. of Technology. Prof., Plant Biology/Applied and Engineering Physics†
Davies, Peter J., Ph.D., U. of Reading. Assoc. Prof., Plant Biology
Dress, William J., Ph.D., Cornell U. Prof., Bailey Hortorium
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. Prof., Ecology and Systematics/Entomology
Fink, Gerald R., Ph.D., Yale U. Prof., Biochemistry, Molecular and Cell Biology/Genetics and Development
Fox, Thomas D., Ph.D., Harvard U. Asst. Prof., Genetics and Development
Gibson, Jane, Ph.D., U. of London. Prof., Biochemistry, Molecular and Cell Biology
Harris-Warrick, Ronald M., Ph.D., Stanford U. Asst. Prof., Neurobiology and Behavior
Hausfater, Glenn, Ph.D., U. of Chicago. Assoc. 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. Prof., Plant Biology
Keller, Elizabeth B., Ph.D., Cornell U. Assoc. Prof., Biochemistry, Molecular and Cell Biology
Kingsbury, John M., Ph.D., Harvard U. Prof., Plant Biology/Clinical Sciences†
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. Asst. Prof., Physiology/Veterinary Physiology†
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. Assoc. Prof., Biochemistry, Molecular and Cell Biology

Niklas, Karl J., Ph.D., U. of Illinois. Asst. Prof., Plant Biology
 Paolillo, Dominick J., Jr., Ph.D., U. of California at Davis. Prof., Plant Biology
 Parthasarathy, Mandayam V., Ph.D., Cornell U. Assoc. Prof., Plant Biology*
 Pough, F. Harvey, Ph.D., U. of California at Los Angeles. Assoc. Prof., Ecology and Systematics/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. Prof., Plant Biology
 Srb, Adrian M., Ph.D., Stanford U. Jacob Gould Schurman Professor, Genetics and Development*
 Stinson, Harry T., Jr., Ph.D., Indiana U. Prof., Genetics and Development*
 Tye, Bik-Kwoon, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Biochemistry, Molecular and Cell Biology
 Uhl, Charles H., Ph.D., Cornell U. Assoc. Prof., Plant Biology
 Uhl, Natalie W., Ph.D., Cornell U. Assoc. Prof., Bailey Hortorium
 Vogt, Volker M., Ph.D., Harvard U. Asst. Prof., Biochemistry, Molecular and Cell Biology
 Whalen, Michael D., Ph.D., U. of Texas at Austin. Asst. Prof., Bailey Hortorium/Ecology and Systematics
 Zahler, Stanley A., Ph.D., U. of Chicago. Prof., Genetics and Development*

Joint Appointees

Alexander, Martin, Liberty Hyde Bailey Professor of Soil Science, Agronomy/Ecology and Systematics
 Bloom, Stephen E., Assoc. Prof., Poultry and Avian Sciences/Biological Sciences
 Borror, Arthur C., Adjunct Prof., U. of New Hampshire/Biological Sciences
 Brown, William L., Jr., Prof., Entomology/Ecology and Systematics
 Butler, Walter R., Assoc. Prof., Animal Science/Physiology
 Currie, W. Bruce, Asst. Prof., Animal Science/Physiology
 Delwiche, Eugene A., Prof., Microbiology/Biological Sciences
 Foote, Robert H., Jacob Gould Schurman Professor, Animal Science/Physiology
 LaRue, Thomas A., Adjunct Prof., Boyce Thompson Institute/Plant Biology
 Leopold, A. Carl, Adjunct Prof., Boyce Thompson Institute/Plant Biology
 Madison, James T., Adjunct Asst. Prof., USDA Science and Education Administration/Biological Sciences
 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

College of Arts and Sciences

Blackler, Antonie W., Ph.D., U. of London (England). Prof., Genetics and Development
 Bretscher, Anthony P., Ph.D., Leeds U. (England). Asst. Prof., Biochemistry, Molecular and Cell Biology
 Campenot, Robert B., Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Neurobiology and Behavior

Capranica, Robert R., Sc.D., Massachusetts Inst. of Technology. Prof., Neurobiology and Behavior/Electrical Engineering†
 Chabot, Brian F., Ph.D., Duke U. Assoc. Prof., Ecology and Systematics‡
 Dilger, William C., Ph.D., Cornell U. Assoc. Prof., Neurobiology and Behavior
 Emien, Stephen T., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior‡
 Feigenson, Gerald W., Ph.D., California Inst. of Technology. Asst. Prof., Biochemistry, Molecular and Cell Biology
 Fessenden-Raden, June M., Ph.D., Tufts U. Assoc. Prof., Biochemistry, Molecular and Cell Biology
 Fortune, Joanne E., Ph.D., Cornell U. Asst. Prof., Physiology/Women's Studies
 Gibson, Quentin H., Ph.D./D.Sc., Queen's U. (Northern Ireland). Greater Philadelphia Professor in Biological Sciences, Biochemistry, Molecular and Cell Biology‡
 Hall, Charles A. S., Ph.D., U. of North Carolina at Chapel Hill. Asst. Prof., Ecology and Systematics
 Halpern, Bruce P., Ph.D., Brown U. Prof., Neurobiology and Behavior/Psychology
 Heppel, Leon A., Ph.D., U. of California at Berkeley. Prof., Biochemistry, Molecular and Cell Biology
 Hess, George P., Ph.D., U. of California at Berkeley. Prof., Biochemistry, Molecular and Cell Biology
 Hinkle, Peter C., Ph.D., New York U. 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/Anthropology/Asian Studies
 Levin, Simon A., Ph.D., U. of Maryland at College Park. Prof., Ecology and Systematics‡
 Likens, Gene E., Ph.D., U. of Wisconsin at Madison. Prof., Ecology and Systematics‡
 McCarty, Richard E., Ph.D., Johns Hopkins U. Prof., Biochemistry, Molecular and Cell Biology‡
 McFarland, William N., Ph.D., U. of California at Los Angeles. Prof., Ecology and Systematics/Physiology
 Parker, Pamela J., Ph.D., Yale U. Asst. Prof., Ecology and Systematics
 Podleski, Thomas R., Ph.D., Columbia U. Assoc. Prof., Neurobiology and Behavior‡
 Racker, Efraim, M.D., U. of Vienna. 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. Asst. Prof., Neurobiology and Behavior
 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
 Wu, Ray, Ph.D., U. of Pennsylvania. Prof., Biochemistry, Molecular and Cell Biology

Joint Appointees

Hammes, Gordon G., Horace White Professor of Chemistry and Biochemistry, Chemistry/Biochemistry, Molecular and Cell Biology
 Provine, William B., Assoc. Prof., History/Biological Sciences
 Regan, Elizabeth Adkins, Asst. Prof., Psychology/Neurobiology and Behavior
 Rhee, G-Yull, Adjunct Assoc. Prof., NYS Department of Health/Ecology and Systematics
 Risch, Stephen J., Asst. Prof., STS/Ecology and Systematics

New York State College of Veterinary Medicine

Corradino, Robert A., Ph.D., Cornell U. Assoc. Prof., Physiology/Veterinary Physiology
 Gasteiger, Edgar L., Ph.D., U. of Minnesota. Prof., Physiology/Veterinary Physiology
 Hansel, William, Ph.D., Cornell U. Liberty Hyde Bailey Professor of Animal Physiology, Physiology/Veterinary Physiology/Animal Science*‡
 Lengemann, Frederick W., Ph.D., U. of Wisconsin at Madison. Prof., Physiology/Veterinary Physiology
 Tapper, Daniel N., Ph.D., Cornell U. Prof., Physiology/Neurobiology and Behavior/Veterinary Physiology
 Wasserman, Robert H., Ph.D., Cornell U. Prof., Physiology/Veterinary Physiology/Nutritional Sciences

Joint Appointees

Bergman, Emmett N., Prof., Veterinary Physiology/Physiology
 Dobson, Alan, Prof., Veterinary Physiology/Physiology
 Evans, Howard E., Prof., Anatomy/Biological Sciences
 Gillespie, James H., Prof., Microbiology/Biological Sciences
 Houpt, Katherine A., Asst. Prof., Veterinary Physiology/Physiology
 Houpt, T. Richard, Prof., Veterinary Physiology/Physiology

College of Engineering

Joint Appointee

Cisne, John L., Asst. Prof., Geological Sciences/Biological Sciences

Division of Nutritional Sciences

Joint Appointees

Arion, William J., Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
 Bensadoun, Andre, Prof., Nutritional Sciences/Physiology
 Dills, William L., Jr., Asst. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
 Kazarinoff, Michael N., Asst. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
 Zilversmit, Donald B., Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology

*Joint appointment with the College of Arts and Sciences.

†Joint appointment with the College of Veterinary Medicine.

‡Joint appointment with the College of Agriculture and Life Sciences.

¶Joint appointment with the College of Engineering.

Graduate School of Business and Public Administration

Administration

Edward G. Jordan, dean
David A. Thomas, associate dean
Edward T. Lewis, associate dean for external affairs
Thomas J. Calo, assistant dean for placement
James W. Schmotter, assistant dean for admissions and student affairs
JoAnne F. Kloppenburg, registrar and assistant director of admissions and student affairs
Ann L. Calkins, director of external affairs
Harriet A. Peters, assistant director of placement—Sloan Program
Caroline Violette, director of administration, Public Administration Program

The Graduate School of Business and Public Administration prepares men and women for managerial careers in private business, public service, and health care. The school offers course work in many disciplines to provide potential business, public, and health managers with an understanding of the complexities of the professional world in which they will operate and of the organizations of which they will become a part.

A bachelor's degree or its equivalent is required for admission to the two-year program leading to the Master of Business Administration [M.B.A.], Master of Public Administration [M.P.A.], or Master of Professional Studies (Hospital and Health Services Administration) [M.P.S. (H.H.S.A.)]. Students may also earn an M.B.A. with a concentration in public or health administration. Over half of the students have a background of undergraduate studies in arts and sciences and about one-quarter in engineering. One-half of the students begin their graduate training immediately after receiving their bachelor's degrees and the remaining half following work experience.

Combined degree programs allow highly qualified Cornell students to register in the school during their senior year, thereby earning a master's degree in less than the usual time.

The doctoral program, administered through the Graduate School, provides an advanced and comprehensive education in administration, primarily for those who seek careers in teaching and research.

More-detailed information about these programs is available in the *Announcement of the Graduate School of Business and Public Administration*, obtainable from the Assistant Dean for Admissions and Student Affairs, Graduate School of Business and Public Administration, Malott Hall.

NCC Common Core Courses

- NCC 500** Managerial Accounting
- NCC 501** Quantitative Methods for Management
- NCC 502** Economic Principles for Management
- NCC 503** Introduction to Computer Programming
- NCC 504** Introduction to Management Information Systems

NBP Business Administration Program Core Courses

- NBP 500** Marketing Management
- NBP 501** Production and Operations Management
- NBP 502** Managerial Finance
- NBP 503** Business Policy
- NBP 504** Introduction to the Business-Government Interface

NBA Business Administration Elective Courses

- NBA 500** Intermediate Accounting
- NBA 501** Advanced Accounting
- NBA 502** Cost Accounting
- NBA 504** Introduction to Taxation Affecting Business and Personal Decision Making
- NBA 505** Auditing
- NBA 506** Financial Information Evaluation
- NBA 507** Federal Income Tax
- NBA 508** Advanced Cost Accounting
- NBA 510** Law of Business Associations
- NBA 511** Advanced Business Law
- NBA 513** An Introduction to Estate Planning
- NBA 514** Financial Policy Decisions
- NBA 515** Economic Evaluation of Capital Investment Projects
- NBA 516** Investment Management
- NBA 517** Security Analysis
- NBA 518** Financial Markets and Institutions
- NBA 519** Seminar in Bank Management
- NBA 521** Finance Theory
- NBA 524** Options, Bonds, and Commodities
- NBA 525** Investment Banking
- NBA 541** Marketing Research
- NBA 542** Advertising Management
- NBA 544** Seminar in Marketing Planning: Topics and Cases
- NBA 545** Management of Marketing Intermediaries
- NBA 546** Marketing Decision Analysis
- NBA 547** Demand Analysis and Consumer Behavior
- NBA 548** Marketing Management of Industrial Products
- NBA 550** Special Topics in Marketing Management

NBA 551 Topics in Consumer Behavior

NBA 552 Seminar in Current Research in Marketing

NBA 553 Product Planning

NBA 559 Research Methods in Operations Management

NBA 560 Production Management

NBA 562 Business Logistics Management

NBA 563 Policy Issues for the 80s

NPP Public Administration Program Core Course

- NPP 500** Economic Foundations of Public Policy
- NPP 501** Public Financial Management
- NPP 502** Policy Considerations: The Business-Government Interface
- NPP 503** The Conduct of Public Affairs

NPA Public Administration Elective Courses

- NPA 500** Urban Government Operations
- NPA 507** Integrative Seminar: Education for Public Management Program (Part I)
- NPA 508** Integrative Seminar: Education for Public Management Program (Part II)
- NPA 512** Seminar in Public Systems Analysis
- NPA 515** The Politics of Technical Decisions I
- NPA 516** The Politics of Technical Decisions II
- NPA 518** Public Affairs Colloquium
- NPA 520** Legal Process
- NPA 521** Energy and Public Policy
- NPA 522** Issues in Energy Policy

NHP Hospital and Health Services Administration Program Core Course

- NHP 500** Introduction to Health Services

NHA Hospital and Health Services Administration Program Elective Courses

- NHA 501** Hospital Strategic Planning
- NHA 502** Psychiatric Institutions: Administration and Practice
- NHA 503** Primary Health Care Services: Policy and Planning
- NHA 504** Legal Aspects of Hospital Administration

NHA 505 Health Services Research and Evaluation

NHA 506 Health Economics

NHA 507 Health and Welfare Policy

NHA 508 Introduction to HMOs

NHA 509 Health Operations Management and Planning

NHA 510 Seminar in Hospital Management

NHA 511 Field Studies in Health Administration and Planning

NHA 513 Long-Term Care Services: Policy and Planning

NHA 514 Washington Health Policy Field Seminar

NHA 515 Orientation to Tertiary Hospital Services

NHA 516 Selected Topics in the Administration of Teaching Hospitals

NHA 517 Introduction to Clinical Medicine: The Physician, the Hospital, and the Delivery of Medical Care

NHA 518 Financial Management of Hospitals

NHA 519 International Comparisons of Health Services

NHA 520 Labor Relations in the Health Industry

NHA 521 State Government Health Policy Seminar

NCE 564 Applied Multivariate Analysis

NCE 565 Applied Econometrics

NCE 566 Management Science

NCE 568 Computer-Based Modeling

NCE 581 Management Writing

NCE 582 Oral Communication

NMI and NRE Research

NMI 500-502 Directed Reading and Research

NMI 510 Personal Computing Laboratory

NRE 503 Advanced Capitol Market Theory

NRE 504 Doctoral Seminar in Accounting

NRE 505 Finance Workshop

NRE 506 Doctoral Seminar in Monetary Economics

NRE 507 Advanced Corporate Finance Theory

NRE 508 Advanced Seminar in Banking and Financial Markets

NRE 942 Social Psychology of Organizing

Faculty Roster

Ahlers, David M., Ph.D., Carnegie-Mellon U. Assoc. Prof., Management
 Battistella, Roger M., Ph.D., U. of Michigan. Prof., Medical Care Organization
 Begun, James W., Ph.D., U. of North Carolina. Asst. Prof., Health Care Administration
 Bent, Fredrick T., Ph.D., U. of Chicago. Assoc. Prof., Public Administration
 Bierman, Harold, Jr., Ph.D., U. of Michigan. Nicholas H. Noyes Professor of Business Administration, Business Administration
 Brooks, Earl, M.S., American U. Prof., Administration
 Bugliari, Joseph B., J.D., Cornell U. Prof., Agricultural and Business Law
 Dyckman, Thomas R., Ph.D., U. of Michigan. Ann Whitney Olin Professor of Accounting, Accounting
 Eastaugh, Steven R., Sc.D., Johns Hopkins U. Asst. Prof., Health Economics and Hospital Finance
 Elliott, John A., Ph.D., Cornell U. Asst. Prof., Accounting
 Flash, Edward S., Jr., Ph.D., Cornell U. Assoc. Prof., Public Administration
 Gautschi, David A., Ph.D., U. of California at Berkeley. Asst. Prof., Marketing
 Hass, Jerome E., Ph.D., Carnegie-Mellon U. Prof., Managerial Economics and Finance
 Hilton, Ronald W., Ph.D., Ohio State U. Assoc. Prof., Accounting
 Jarow, Robert A., Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Finance
 Jordan, Edward G., M.B.A., Stanford U. Prof., Management
 Lind, Robert C., Ph.D., Stanford U. Prof., Economics and Public Administration
 Lodahl, Thomas M., Ph.D., U. of California at Berkeley. Prof., Administration
 McAdams, Alan K., Ph.D., Stanford U. Assoc. Prof., Managerial Economics
 McClain, John O., Ph.D., Yale U. Assoc. Prof., Quantitative Analysis
 Morse, Dale, Ph.D., Stanford U. Asst. Prof., Accounting
 O'Hara, Maureen, Ph.D., Northwestern U. Asst. Prof., Finance

Oldfield, George S., Ph.D., U. of Pennsylvania. Assoc. Prof., Economics and Finance
 Ormancioglu, Levent, Ph.D., Northwestern U. Asst. Prof., Computer Management
 Rao, Vithala R., Ph.D., U. of Pennsylvania. Emerson Electric Company Professor of Marketing, Marketing/Quantitative Analysis
 Reece, Douglas K., Ph.D., U. of California at Berkeley. Asst. Prof., Information Systems and Management Science
 Rudd, Andrew T., Ph.D., U. of California at Berkeley. Asst. Prof., Finance and Operations Research
 Sabavala, Darius J., Ph.D., Columbia U. Asst. Prof., Marketing and Management Science
 Smidt, Seymour, Ph.D., U. of Chicago. Nicholas H. Noyes Professor of Economics and Finance, Managerial Economics
 Smiley, Robert H., Ph.D., Stanford U. Assoc. Prof., Economics and Public Policy
 Swieringa, Robert J., Ph.D., U. of Illinois. Prof., Accounting
 Thaler, Richard H., Ph.D., U. of Rochester. Assoc. Prof., Economics and Public Administration
 Thomas, David A., Ph.D., U. of Michigan. Prof., Accounting
 Thomas, L. Joseph, Ph.D., Yale U. Prof., Production and Quantitative Analysis
 Weick, Karl E., Ph.D., Ohio State U. Nicholas H. Noyes Professor of Organizational Behavior Psychology and Organizational Behavior
 Weiss, Elliott N., Ph.D., U. of Pennsylvania. Asst. Prof., Operations Management
 Wittink, Dick R., Ph.D. Purdue U. Assoc. Prof., Marketing and Quantitative Methods
 Zahorik, Anthony J., Ph.D., Cornell U., Asst. Prof. of Marketing

Lecturer

Rosen, Charlotte, Ph.D., Cornell U. Lec., Management Communication

Adjunct and Visiting Faculty

Abelow, William J., J.D., Columbia U. Visiting Assoc. Prof., Labor Relations in the Health Industry
 Brown, Douglas R., Ph.D., Syracuse U. Coordinator, Health Services Development and Continuing Education
 Chester, Theodore E., C.B.E., J.D., U. of Manchester. Visiting Prof., Comparative Development in Health Services
 Crane, Robert M., M.B.A., Cornell U. Visiting Prof. of Health Policy
 Daly, Robert W., M.D. SUNY at Syracuse. Visiting Prof., Administrative Medicine
 Dotson, Arch T., Ph.D., Harvard U. Prof., Government
 Esman, Milton J., Ph.D., Princeton U. John S. Knight Professor of International Studies
 Kaplan, Eugene A., M.D., SUNY at Syracuse Upstate Medical Center. Visiting Prof., Administrative Medicine
 Kern, John E., M.P.A., Cornell U. Visiting Prof., Health Policy and Planning
 LaCosta, Cosmo J., M.P.A., New York U. Visiting Prof., Hospital Administration
 Ley, Allyn B., M.D., Columbia U. Visiting Prof., Administrative Medicine
 Thompson, David D., M.D., Cornell U. Visiting Prof., Hospital Administration
 Yanni, Frederick, M.P.A., Cornell U. Visiting Prof., H.M.O. Development and Management

NCE Common Course Electives

NCE 500 Fund Accounting

NCE 504 The Political Economy in National and International Perspectives

NCE 505 International Trade and Finance

NCE 507 American Business Operations Abroad

NCE 514 Administration of Agricultural and Rural Development

NCE 523 Macroeconomic Theory and Policy

NCE 526 Government Regulation of Business

NCE 527 American Industry: Economic Analysis and Public Policy

NCE 528 Topics in Managerial Economics

NCE 540 Organizational Theory and Behavior

NCE 541 Personnel Administration and Human Relations

NCE 542 Processes and Techniques in Organizational Development

NCE 547 Negotiations

NCE 548 Behavioral Science and Managing

NCE 549 Sociotechnical Issues in Office Automation

NCE 551 Behavioral Decision Theory

College of Engineering

Administration

Thomas E. Everhart, dean
 Donald F. Berth, associate dean
 Malcolm S. Burton, associate dean
 Daniel P. Loucks, associate dean
 Benjamin Nichols, assistant dean and director
 of Division of Basic Studies
 Ron W. Simmons, assistant dean
 Gilbert F. Rankin, director of administrative
 operations and facilities
 Robert E. Gardner, director of admissions
 Mariea T. Blackburn, associate director of
 admissions
 Robert L. Smith, assistant director of admissions
 Gladys J. McConkey, senior editor, engineering
 publications
 Jane H. Pirko, registrar
 Carol A. Walck, director of placement

Facilities

Most of the academic units of the College of Engineering are centered in the ten modern buildings located on the 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:

Cornell Computing Facility. A central IBM 370/168 system, a DEC system 2060, satellite stations, and interactive terminals.

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. Provides highly sophisticated equipment for 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. An interdisciplinary facility centered in the School of Electrical Engineering.

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, including discussions of two alternative course programs, 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 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 Master of Engineering degrees, and the academic areas under which they are described, are listed below.

M.Eng. (Aerospace): Mechanical and aerospace engineering

M.Eng. (Agricultural): Agricultural engineering

M.Eng. (Chemical): Chemical engineering

M.Eng. (Civil): Civil and environmental engineering

M.Eng. (Computer Science): Computer science

M.Eng. (Electrical): Electrical engineering

M.Eng. (Engineering Physics): Applied and engineering physics

M.Eng. (OR&IE): Operations research and industrial engineering

M.Eng. (Materials): Materials science and engineering

M.Eng. (Mechanical): Mechanical and aerospace engineering

M.Eng. (Nuclear): Nuclear science and engineering

Cornell engineering graduates in the upper half of their class will generally be admitted to the program; however, requirements for admission vary by field. Other applicants must have a baccalaureate degree from an engineering program accredited by the Accreditation Board for Engineering and Technology, or its equivalent, in an area of engineering or science that is judged appropriate for the proposed field of study. They must also present evidence of undergraduate preparation equivalent to that provided by a Cornell undergraduate engineering education: a transcript, two letters of recommendation, and a statement of academic purpose. A candidate who is admitted with an undergraduate background that is judged inadequate must make up any deficiencies in addition to fulfilling the regular course requirements for the degree. Application forms and further information are available from the chairperson of the Graduate Professional Programs Committee, Hollister Hall.

Cooperative Program with Business and Public Administration

A dual program culminating in both Master of Engineering and Master of Business Administration degrees is available for students with suitable undergraduate background. The curriculum generally requires two years of study beyond the baccalaureate, rather than the three years such a

program would normally require; with appropriate choice of undergraduate courses, it is possible to earn the Bachelor of Science, the Master of Engineering, and the Master of Business Administration degrees in six years.

Students interested in this special program should plan their undergraduate curricula with this in mind. Advice and information should be sought from the undergraduate engineering department in which the student is taking an upperclass field program. Information about admission to the graduate program and about special scholarship aid that is available may be obtained from the Graduate Professional Programs Committee, Hollister Hall.

Undergraduate Study

Bachelor of Science (B.S.) degrees are offered in the following areas:

Agricultural engineering*

Chemical engineering

Civil and environmental engineering

College program

Computer science

Electrical engineering

Engineering physics

Geological sciences

Materials science and engineering

Mechanical engineering

Operations research and industrial engineering

Depending on the date of matriculation, students follow either course program A or course program B, which are outlined below. Under either plan, the curriculum begins in the Division of Basic Studies and is completed in an upperclass program with a major selected from the areas listed. After completing their basic studies, most students enter *field programs*, which are described under the appropriate academic areas. An alternative is the *college program*, which permits the student to design an individualized program; this is described below. (It should be noted that in this edition of the Announcement, the upperclass curricula are discussed in terms of course program A; students entering as freshman this year should anticipate some future changes in the upperclass curricula as necessitated by the requirements of course program B.)

A student interested in bioengineering may arrange a suitable curriculum within one of the field programs or through the college program. Information about the options is available in the Engineering Advising and Counseling Center, 167 Olin Hall.

*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.

Course Program A

For Students of the Class of 1984 or Earlier

The curriculum for sophomores, juniors, and seniors presently enrolled comprises an underclass program extending through the sophomore year, followed by an upperclass program with an engineering major.

For these students, all the undergraduate curricula (except the one in agricultural engineering) begin with a two-year program, administered by the college's Division of Basic Studies, that provides a foundation in mathematics, science, and engineering fundamentals, and, in addition, elective course work in engineering core sciences, liberal studies, and

natural or social sciences. The upperclass program, usually a field program, begins in the junior year. The guidelines for a field program call for twelve field-designated courses, four liberal-studies electives, two free electives, and two technical electives. The overall degree requirement is forty courses totalling at least 127 credits.

Under this course program, the four-year curriculum includes at least eight liberal-studies courses giving a minimum of 24 credits. These liberal-studies electives may include courses in the humanities, social sciences, modern foreign languages, and expressive arts; at least two (giving a minimum of 6 credits) must be at the upperclass level (300- or 400-level courses).

The basic-studies curriculum (as it pertains to students who are sophomores in 1981-82) must include the following course work.

- 1) A sequence of four courses in mathematics; a three-term sequence in physics; and one term of chemistry. (Students who are interested in bioengineering or premedical studies also need biology and a second term of chemistry.)
- 2) The course Engr 105, Introduction to Computer Programming and the course Engr 106, Engineering Perspectives.
- 3) Four engineering core sciences, selected from those listed below.
- 4) Four liberal-studies electives, normally one each term. (An exception is allowed for students who, because of their anticipated upperclass program, must take introductory courses in the natural sciences; they may substitute courses in subjects such as biology or organic chemistry for the liberal-studies electives during the sophomore year and defer these electives until the junior or senior year.)
- 5) Two terms of physical education to meet the University requirements.

Engineering Core Sciences

The four engineering core sciences required of students who are sophomores in 1981-82 are selected from at least three of the four following groups.

Group 1

OR&IE 260, Introductory Engineering Probability
OR&IE 270, Basic Engineering Probability and Statistics
Com S 211, Computers and Programming
Com S 321, Numerical Methods

Group 2

Ele E 210, Introduction to Electrical Systems
Ele E 230, Introduction to Digital Systems
MS&E 262, Introduction to Electrical Properties of Materials
A&EP 206, The Physics of Life
A&EP 217, The Physics of Energy

Group 3

T&AM 202, Mechanics of Solids
T&AM 203, Dynamics
MS&E 261, Introduction to Mechanical Properties of Materials

Group 4

Chem 287, 289, Introductory Physical Chemistry and Laboratory

Chem 288, 290, Introductory Physical Chemistry and Laboratory

Chem 357, Introductory Organic Chemistry

Chem 358, Introductory Organic Chemistry

M&AE 221, Thermodynamics

Chem E 110 or 111, Mass and Energy Balances

An important consideration in the choice of these courses is that each upperclass field may specify a particular engineering core science as a prerequisite for enrollment in the junior year. The courses required for entry into the different field programs are:

Applied and engineering physics: M&AE 221 or Chem 287

Chemical engineering: Chem E 110 or 111*

Civil and environmental engineering: T&AM 202

Computer science: Com S 211

Electrical engineering: Ele E 210

Geological sciences: no requirement

Materials science and engineering: no requirement

Mechanical and Aerospace engineering: T&AM 202

Operations research and industrial engineering: OR&IE 260

*Students who intend to enter chemical engineering must also take Chemistry 287, 289, and Chemistry 288, 290 during the sophomore year. Only two of the Group 4 courses may be counted toward the four engineering core sciences required of all sophomores. Students who take the three courses from Group 4 during the sophomore year may be unable to complete the engineering core science requirements that year, and may defer the fourth engineering core science until the junior year.

Example of Basic Studies Curriculum

A typical program for the freshman and sophomore years (for students of the Class of 1984 or earlier) is given as an example. It should be noted, however, that there are many variations, depending on each student's background and educational and career plans.

Term 1	Credits
Math 191 or 193, Calculus for Engineers	4
Chem 207, General Chemistry	4
Freshman engineering course, Engr 105 or 106	3
Natural or social science elective	3
Freshman Seminar	3
Term 2	
Math 192 or 194, Calculus for Engineers	4
Phys 112, Physics I (Mechanics)	4
Freshman engineering course, Engr 105 or 106	3
Natural or social science elective*	3
Freshman Seminar	3
Term 3	
Math 293, Engineering Mathematics	4
Phys 213, Physics II (Electricity and Magnetism)	4
Engineering core science elective	3
Engineering core science elective	3
Liberal studies elective	3
Term 4	
Math 294, Engineering Mathematics	3
Phys 214, Physics III (Optics, Waves, and Particles)	4
Engineering core science elective	3
Engineering core science elective	3
Liberal studies elective	3

*Students who want to major in chemical engineering and students who are interested primarily in bioengineering and premedical studies must take Chemistry 208 during the freshman year. Chemical engineering students will select a considerably different program in the sophomore year (see discussion above under Engineering Core Sciences).

Course Program B

For Students of the Class of 1985 and Later

Engineering students who matriculate as freshmen in August, 1981, or later, will follow a recently modified curriculum. They should work closely with their advisers to be sure they understand and meet the new requirements for the Bachelor of Science degree. The choice of elective courses in various categories, for example, should be made in consultation with the adviser.

The four-year curriculum includes a common program that requires certain course work in mathematics, science, and engineering fundamentals and is supplemented by engineering distribution courses, humanities courses, social sciences, free electives, technical electives, and approved electives. The degree requirements are completed with course work in a major, usually a field program. Students are normally enrolled in the Division of Basic Studies for their first two years, but they have the option of selecting and entering an upperclass program in either term of the sophomore year. The overall requirements for the degree include a total of at least 128 credits.

To meet the common curriculum requirements, each student's program must include the following course work:

- 1) Mathematics: 15 credits.
A sequence of three common courses in mathematics, plus an approved fourth mathematics course. The three common courses are Mathematics 191 or 193, Mathematics 192, and Mathematics 293.
- 2) Physics: 12 credits.
A sequence of three physics courses, or two physics courses plus an approved field course.
- 3) Chemistry: 4 credits.
- 4) Computing: 7 credits.
The course Engineering 105, Introduction to Computer Programming, and an additional course in computing applications. This second course can be a computer science course beyond Engineering 105 or a field-program course that includes a significant amount of computing. Ordinarily the second course is not an additional requirement, but is met by an appropriate course that also satisfies another curriculum requirement.
- 5) Engineering distribution courses: 12 credits.
One course from each of four of the seven areas listed below.
- 6) Approved electives: 9 credits.
Electives selected as an appropriate extension of any part of the common curriculum.
- 7) Humanities and social science electives: 24 credits, earned in a minimum of eight courses.
Six credits for Freshman Seminars, plus 9 credits for humanities courses and 9 credits for humanities or social science courses.
- 8) Technical electives: 6 credits.
Science, mathematics, or engineering courses taken at an appropriate level.
- 9) Free electives: 6 credits.
No restrictions.
- 10) Physical education: 2 terms, to meet the University requirement.

In addition to the common curriculum outlined above, each student must complete a 36- to 48-credit program of field-designated courses or the equivalent in a college program. Details of the various field programs as they will be adapted to the new curriculum plan (Course Program B) will be given in the 1982-83 edition of this Announcement.

Engineering Distribution Courses

Four engineering distribution courses (12 credits) are required in the curriculum that will be followed by freshmen matriculating in August 1981 and later. These courses are selected from the seven areas listed below. Four of the areas must be represented in the choices.

- 1) Scientific Computing**
Engr 211, Computers and Programming
Engr 321, Numerical Methods
- 2) Materials Science**
Engr 261, Introduction to Mechanical Properties of Materials
- 3) Mechanics**
Engr 202, Mechanics of Solids
Engr 203, Dynamics
- 4) Probability and Statistics**
Engr 260, Introductory Engineering Probability
Engr 270, Basic Engineering Probability and Statistics
- 5) Electrical Sciences**
Engr 210, Introduction to Electrical Systems
- 6) Thermodynamics and Energy Balances**
Engr 111, Mass and Energy Balances
Engr 211, Thermodynamics
- 7) Introduction to Engineering**
A group of several courses, now being developed, that illustrate the nature of engineering.

Examples of Underclass Curriculum

A typical program for the freshman and sophomore years (for students of the class of 1985 and later) is given as an example. It should be noted, however, that there are many variations, depending on each student's background and educational and career goals.

Term 1	Credits
Math 191 or 193, Calculus for Engineers	4
Chem 207, General Chemistry	4
Engr 105, Introduction to Computer Programming or approved elective	3 or 4
Freshman Seminar	3
Term 2	
Math 192, Calculus for Engineers	4
Phys 112, Physics I (Mechanics)	4
Approved elective or Engr 105, Introduction to Computer Programming	3
Engineering distribution course	3
Freshman Seminar	3
Term 3	
Math 293, Engineering Mathematics	4
Phys 213, Physics II (Electricity and Magnetism)	4
Approved elective	3
Engineering distribution course	3
Humanities or social science elective	3 or 4
Term 4	
Math 294, Engineering Mathematics, or approved substitution	4
Phys 214, Physics III (Optics, Waves, and Particles), or approved substitution	4
Engineering distribution course	3 or 4
Engineering distribution course	3
Humanities or social science elective	3 or 4

College Program

Individually arranged courses of study under the College Program are possible for those whose educational objectives cannot be met by one of the regular field programs. Often the desired curriculum is in an interdisciplinary area. Each program is developed by the student in consultation with faculty advisers and must be approved by the College Program Committee, which is responsible for supervising the student's work.

Students apply to enter the College Program early in the second term of the sophomore year. A student may receive assistance in developing a coherent

program from professors in the proposed major and minor subject areas. If approved, the program is the curricular contract to which the student must adhere.

Every curriculum in the College Program, with the exception of certain faculty-sponsored programs, must comprise an engineering major and a minor. The major may be in any subject area offered by schools or departments of the college; the minor may be in a second engineering subject area or in a logically connected nonengineering area. The combinations must clearly form an engineering education in scope and in substance and should include engineering design and synthesis as well as engineering sciences. In addition to fourteen courses in the major and minor subjects, including at least seven engineering courses, each program includes humanities and social science electives and free electives.

Further information about the College Program, may be obtained from the College Program Office, 253 Carpenter 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 Associate Dean M. S. Burton, 253 Carpenter Hall.

Engineering Cooperative Program

A special program for undergraduates in most fields of engineering is the Engineering Cooperative Program, which provides an opportunity to supplement course work with carefully monitored, paid jobs in industry and other engineering-related enterprises. Sophomores in the upper half of their class are eligible to apply for the program; students from foreign countries must have visas that allow them to work in the United States.

Prospective co-op students are interviewed by representatives of cooperating companies and select their work assignments from any offers they receive. Those students who are offered assignments and elect to join the program take their fifth-term courses at Cornell during the summer following their sophomore year, and begin their first co-op work assignment that fall. They return to Cornell to complete term 6 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 academic credit is intended to permit students to develop more challenging and stimulating programs of study. Two ways in which freshmen may use such credit are detailed below.

- 1) AP credit can be used to fulfill basic requirements, thus permitting advanced study in the same subject area or enrollment in additional nontechnical elective courses.
- 2) In a few cases, students may receive enough AP credit to complete the B.S. degree requirements ahead of time.

The college's policies concerning placement credit and its use in developing undergraduate programs are fully described in the publication *Advanced Placement for Engineers*, which may be obtained at the Division of Basic Studies, 167 Olin Hall, or the Engineering Admissions Office, 221 Carpenter Hall.

Transfer Credit

Entering freshman and entering transfer students who have completed courses at recognized and accredited colleges may, under certain conditions, have credits for such courses transferred to Cornell. Such courses must represent academic work in excess of that required for the secondary school diploma.

College courses completed under the auspices of cooperative college-high school programs may be considered for an exception to these general policies concerning advanced standing. Credit for such courses is not automatically given, however; students must be prepared to demonstrate academic proficiency by taking the appropriate CEEB or Cornell departmental placement examination, as described above.

Academic Standing

The requirements for good standing in the college vary slightly among the different divisions. Freshmen must have a grade point average of 1.7 or higher with no failing, unsatisfactory, or incomplete grades. Sophomore requirements are the same, except that the grade point average must be at least 2.0. Upperclass requirements depend upon the field of registry.

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 1980-81 a term average of 3.25 or higher was required, with no failing, unsatisfactory, or incomplete grades, and 12 credits or more of letter grades.

Agricultural Engineering

N. R. Scott, chairman; L. D. Albright, R. D. Black, J. R. Cooke, R. B. Furry, W. W. Gunkel, D. A. Haith, L. H. Irwin, W. J. Jewell, G. Levine, R. C. Loehr, H. A. Longhouse, R. T. Lorenzen, D. C. Ludington, W. F. Millier, G. E. Rehkugler, 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 Eng 151, 152, Computer Programming and Graphics	4
Engineering core sciences (four courses, including Mechanics of Solids, Dynamics, and Thermodynamics)	12

Liberal studies electives (four courses, including two in written expression and one in oral expression) 12

Advanced and Applied Subjects

Engineering sciences (Fluid Mechanics; Ag Eng 250, Engineering Applications in Biological Systems; and four agricultural engineering courses above 450 (for a minimum of 12 credits), excluding seminar or special-problems courses) 30
 Biological or agricultural sciences 12
 Liberal studies electives 12
 Free electives 8
 Total credits 127 to 129

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 thirty credits consist of an engineering design project which 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

J. Silcox, director; A. F. Kuckes, associate director; B. W. Batterman, R. A. Buhrman, K. B. Cady, D. D. Clark, R. K. Clayton, T. A. Cool, H. H. Fleischmann, P. L. Hartman, M. S. Isaacson, V. O. Kostroun, J. A. Krumhansl, B. R. Kusse, A. Lewis, R. L. Liboff, R. V. Lovelace, M. S. Nelkin, T. N. Rhodin, M. M. Salpeter, B. M. Siegel, R. N. Sudan, W. W. Webb, G. J. Wolga

The engineering physics curriculum is designed to develop basic proficiency in physics in students who want to pursue careers in research and development in science and technology. Its distinguishing feature is a focus on fundamental physics, both experimental and theoretical, which has broad applicability in engineering and in science.

The industrial demand for baccalaureate graduates is high, and many students go directly into industrial positions. However, most graduates go on to advanced study in a variety of fields, including astrophysics, atmospheric sciences, biophysics, energy conversion, environmental science, geophysics, materials science and engineering, nuclear engineering, nuclear physics, oceanography, plasma physics, quantum optics, and solid-state electronics.

Underclass students who are planning to enter the Field Program in Engineering Physics are encouraged to register in honors sections of physics and mathematics during the first two years. Those who have advanced standing in mathematics when they matriculate in the college are advised of the possibility of taking Physics 112 in the fall term of the freshman year and Applied Mathematics* in the spring term of the sophomore year. Required for entry into the field program is a course in thermodynamics: for students following Course Program A, this can be either M&AE 211 or Chemistry 287, taken as engineering core sciences; for students following Course Program B, it is Engineering 211, taken as an engineering distribution course. Recommended for the sophomore year are A&EP 206, The Physics of Life (especially for students with an interest in biophysical engineering) and A&EP 217, The Physics of Energy; these courses may be taken as engineering core sciences under Course Program A.

The following curriculum, or its equivalent, constitutes the upperclass field program.

Term 5	Credits
A&EP 333, Mechanics of Particles and Solid Bodies	4
A&EP 355, Intermediate Electromagnetism	4
Applied Mathematics I*	4
Free elective	3 or 4
Liberal studies elective	3 or 4
Term 6	
A&EP 361, Introductory Quantum Mechanics	4
A&EP 356, Intermediate Electrodynamics	4
Applied Mathematics II*	4
Electronic Circuits†	3 or 4
Liberal studies elective	3 or 4
Term 7	
A&EP 423, Statistical Thermodynamics	4
Phys 410, Advanced Experimental Physics	4
Applied Mathematics III*	4
Technical elective	3 or 4
Liberal studies elective	3 or 4
Term 8	
A&EP 434, Continuum Physics	4
Applications of Quantum Mechanics‡	3 or 4
Free elective	3 or 4
Technical elective	3 or 4
Liberal studies elective	3 or 4

Considerable flexibility is possible in the scheduling of these courses. For example, Physics 410 may be taken in term 7 or in term 8. Quantum mechanics can be studied in term 6 as A&EP 361 or in term 7 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 and Electrical Engineering 303–304 are similar to A&EP 355–356; Physics 318 (offered in the spring) and T&AM 670 are similar to A&EP 333; and a number of advanced courses in fluid mechanics or elasticity are similar to A&EP 434.

*Applied Mathematics I and II may be either Mathematics 421–422 or T&AM 610–611. Applied Mathematics III may be Mathematics 423, T&AM 613–614, or another mathematics course such as Mathematics 411, 427, or 371. Alternate courses will be considered upon petition.

†Electronic Circuits may be A&EP 363 or an equivalent junior-level electronics course.

‡A choice of the following courses may be made: Physics 454, Introductory Solid-State Physics; Physics 444, Nuclear and High-Energy Particle Physics; A&EP 609, Low-Energy Nuclear Physics (fall); A&EP 401, Physics of Atomic and Molecular Processes (fall); Electrical Engineering 731, Quantum Electronics I (fall).

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 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. An area of concentration in an interdisciplinary study, such as biophysics, geophysics, nuclear engineering, lasers and quantum electronics, or plasma physics and materials science, may be arranged through a judicious choice of electives in the freshman and sophomore as well as the upperclass years. Examples of many such programs are described in a special brochure available from the School of Applied and Engineering Physics, Clark Hall. Students interested in this kind of program are advised to consult as early as possible a professor active in the field of interest or with the associate director of the school, Prof. A. F. Kuckes.

Master of Engineering (Engineering Physics) Degree Program

The Master of Engineering (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 specific area such as microfabrication or physical instrumentation. A wide latitude is allowed in the choice of the required design project.

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, shall 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.

Chemical Engineering

J. C. Smith, director; J. F. Cocchetto, G. G. Cocks, C. Cohen, R. K. Finn, K. E. Gubbins, P. Harriott, R. P. Merrill, W. L. Olbricht, F. Rodriguez, G. F. Scheele, M. L. Shuler, W. B. Street, R. G. Thorpe, R. L. VonBerg, H. F. Wiegand

Bachelor of Science Curriculum

The undergraduate Field Program in Chemical Engineering comprises a coordinated sequence of courses beginning in the sophomore year and extending through the fourth year. Special programs in biological engineering, polymeric materials, and chemical microscopy are available. Underclass students who plan to enter the Field Program in Chemical Engineering register for Chemistry 287-288, Chemistry 289-290, and Chemical Engineering 110 or 111 during the sophomore year. The program for the upperclass years is as follows:

Term 5	Credits
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
Liberal studies elective	3
Term 6	
Chem 358, Organic Chemistry*	3
Chem E 312, Chemical Engineering Thermodynamics II	3
Chem E 431, Analysis of Separation Processes	3
Elective†	3
Liberal studies elective	3
Term 7	
Chem E 101, Nonresident Lectures	0
Chem E 410, Reaction Kinetics and Reactor Design	3
Chem E 432, Chemical Engineering Laboratory	3

*Students in the Engineering Cooperative Program substitute Chem 253, Organic Chemistry (a 4-credit course), for Chemistry 357; and Chem E 421, Industrial Organic Processes (a 2-credit course), for Chemistry 358.

†The electives in terms 5 to 8 must comprise 3 credits of the postponed engineering core science course (see the section on Basic Studies); 6 credits of technical electives; and at least 6 credits of free electives. One of the electives in term 8 should be in a chemical engineering subject.

Chem E 461, Chemical Process Evaluation	3
Elective†	3
Liberal studies elective	3
Term 8	
Chem E 462, Chemical Process Synthesis	4
Chem E 671, Process Control	3
Elective†	6
Liberal studies elective	3

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 process, equipment, and plant design alternatives. A design project is involved in the required courses. General admission and degree requirements are described in the college's introductory section.

Civil and Environmental Engineering

School of Civil and Environmental Engineering:
R. N. White, director; J. J. Bisogni, associate director

Department of Structural Engineering: A. H. Nilson, chairman; J. F. Abel, P. Gergely, M. D. Grigoriu, A. R. Ingraffea, I. Ishibashi, F. H. Kulhawy, W. McGuire, T. D. O'Rourke, T. Peköz, 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, I. Ishibashi, G. H. Jirka, J. A. Liggett, L. W. Lion, P. L. -F. Liu, R. C. Loehr, D. P. Loucks, W. R. Lynn, N. Orloff, R. E. Schuler, C. Shoemaker, J. R. Stedinger, M. A. Turnquist

Program in Environmental Sensing, Measurement, and Evaluation: T. Liang, G. B. Lyon, W. R. Philipson

Bachelor of Science Curriculum

There are two departments in the School of Civil and Environmental Engineering, and 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 (T&AM 202 or Engineering 202) during the sophomore year. It is recommended that they also take Introductory Engineering Probability (OR&IE or Engineering 260) and either Dynamics (T&AM 203 or Engineering 203) or Mechanical Properties of Materials (MS&E 261 or Engineering 261). These three courses are required in the field program.

At the upperclass level the curriculum is planned to provide an introduction to the several diverse areas within the field of civil and environmental engineering and to permit more-detailed study in at least one area through appropriate selection of electives. A recommended sequence, including the required courses, is given below.

Term 5	Credits
T&AM 203, Dynamics*	3
CEE C301, Fluid Mechanics I	4
CEE G301, Structural Engineering I	4
OR&IE 260, Introductory Engineering Probability*	3
Liberal studies elective	3
Term 6	
MS&E 261, Introduction to Mechanical Properties of Materials	3
CEE E301, Environmental Quality Engineering	4
CEE D301, Introductory Soil Mechanics	3
CEE B303, Engineering Economics and Systems Analysis	3
Liberal studies elective	3
Term 7	
Civil and environmental engineering distribution courses (2 courses)†	6
Technical elective	3
Free elective	3
Liberal studies elective	3
Term 8	
Civil and environmental engineering distribution courses (2 courses)†	6
Technical elective	3
Free elective	3
Liberal studies elective	3

Master of Engineering (Civil) Degree Program

The Master of Engineering (Civil) degree program is designed to prepare a student 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 K510 and K511). The design sequence requires the completion of a project involving synthesis, analysis, decision making, and application of engineering judgment, and includes an intensive, full-time, three-week session between semesters.

The remainder of a student's program of study is designed individually in consultation with an academic adviser and then submitted to the school's Professional Degree Committee for approval. The objectives in course planning are to provide breadth in the fundamentals of civil and environmental engineering, and specialization in one area with some concentration in a related area. Most students will have achieved the necessary breadth during their undergraduate years. Some, however, may require additional course work in the graduate program to fulfill the breadth requirement. Students in the School of Civil and Environmental Engineering may avail themselves of a number of graduate course offerings in fields related to their major interest but outside of the school.

The School of Civil and Environmental Engineering, in conjunction with the Cornell Graduate School of Business and Public Administration, now offers a six-year, joint program leading to the degrees of Bachelor of Science, Master of Engineering, and Master of Business Administration. Participating students receive the baccalaureate degree after four years and the two professional master's degrees in the next two years.

Applications should be submitted at the beginning of the sixth term of study.

*Satisfactory completion of these engineering core science courses in the Division of Basic Studies increases the number of technical electives accordingly.

†Information about distribution requirements may be obtained from the student's faculty adviser.

Computer Science

J. Hartmanis, chairman; B. Aspvall, O. Babaoglu, T. Coleman, R. L. Constable, R. Conway, A. J. Demers, J. R. Gilbert, D. Gries, J. E. Hopcroft, F. Luk, P. A. Pritchard, G. Salton, F. B. Schneider, D. Skeen, R. Teitelbaum, S. Toueg, C. F. Van Loan

Bachelor of Science Curriculum

The Field Program in Computer Science is intended for students who are interested in the computing process and in the fundamental structure of algorithms, data, and languages that 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 intending to enter the computer science field program must take Computer Science 211 as a sophomore. Computer Science 321 and Electrical Engineering 230 are also required for completion of the field program, but need not be taken prior to admission. The requirements of the field program for terms 5 through 8 are:

Term 5	Credits
Com S 280, Discrete Structures	4
Com S 314, Computer Systems and Organization	4
Com S 410, Data Structures	4
Technical or free elective*	3
Liberal studies elective	3
Term 6	
Com S 414, Systems Programming	4
Field-restricted elective†	3
Technical or free elective*	6
Liberal studies elective	3
Term 7	
Com S 481, Theory of Computing I	4
Field-restricted electives†	6
Technical or free elective*	3
Liberal studies elective	3
Term 8	
Com S 482, Theory of Computing II	4
Field-restricted electives†	6
Technical or free elective*	3
Liberal studies elective	3

*Computer Science 321 and Electrical Engineering 230 are required for completion of the program. If not taken in the Division of Basic Studies prior to admission, they must be taken as technical electives.

†The five field-restricted electives are subject to the following constraints: (a) one must be a computer science course numbered 400 or higher; (b) one must be a mathematically oriented course, approved by the student's adviser; (c) three are expected to form a coherent course sequence in operations research and industrial engineering, in electrical engineering (but note that Electrical Engineering 230 cannot be considered part of this sequence), or in some other technical area.

Master of Engineering (Computer Science) Degree Program

A recent addition to the academic offerings in computer science is the one-year program leading to the degree of Master of Engineering (Computer Science). The program is very small; from two to five students a year are admitted. Admission standards are the same as those applied to doctoral candidates. A good undergraduate background in mathematics or computer science is required.

In the curriculum, the emphasis can be on programming languages and systems, on theory of algorithms and theory of computation, on numerical analysis, or on information processing, which

includes data bases and information organization and retrieval. (Students who are interested in logical design or computer architecture will find it more appropriate to apply for admission to a graduate program in electrical engineering.) The required design project could be, for example, the design of a compiler for a large subset of a general-purpose programming language.

Electrical Engineering

J. M. Ballantyne, director; J. L. Rosson, associate director; P. D. Ankrum, T. Berger, R. Bolgiano, Jr., N. H. Bryant, R. R. Capranica, H. J. Carlin, G. C. Dalman, D. F. Delchamps, L. F. Eastman, W. H. Erickson, T. E. Everhart, D. T. Farley, T. L. Fine, J. Frey, C. Heegard, W. J. Heetderks, M. C. Kelley, M. Kim, W. H. Ku, C. A. Lee, R. L. Libofs, S. Linke, H. S. McGaughan, P. R. McIsaac, J. A. Nation, B. Nichols, C. Pottle, C. E. Seyler, Jr., R. N. Sudan, C. L. Tang, R. J. Thomas, J. S. Thorp, H. C. Torng, N. M. Vrana, J. Walrand, C. B. Wharton, E. D. Wolf, G. J. Wolga

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.

Required courses are included in the following standard curriculum for the field program:

Term 5	Credits
Ele E 301, Electrical Signals and Systems I	4
Ele E 303, Electromagnetic Theory I	4
Ele E 315, Electrical Laboratory I	4
Ele E 230, Introduction to Digital Systems*	3
Liberal studies elective	3
Term 6	
Ele E 306, Fundamentals of Quantum and Solid-State Electronics	4
Ele E 316, Electrical Laboratory II	4
Electrical engineering elective†	4
Electrical engineering elective†	3 or 4
Liberal studies elective	3
Term 7	
Electrical engineering elective†	3 or 4
Electrical engineering elective with laboratory	3 or 4
Technical elective	3
Free elective	3
Liberal studies elective	3
Term 8	
Electrical engineering elective†	3 or 4
Electrical engineering elective with laboratory	3 or 4
Technical elective	3
Free elective	3
Liberal studies elective	3

*Satisfactory completion of Electrical Engineering 230 as a core science in the Division of Basic Studies allows for the substitution of a technical elective for this requirement.

†One electrical engineering elective must be selected from among Ele E 302, 304, 310, or 407. One other electrical engineering elective must be selected which has either Ele E 302, 304, 306, or 310 as a prerequisite.

Specialization is achieved through the four senior-year electrical engineering electives, which are selected from more than sixty offerings of the school. With the approval of his or her faculty adviser, a student with special career goals may substitute appropriate technical or professional electives for two electrical engineering electives.

A brochure describing in detail the field program and concentrations may be obtained from the School of Electrical Engineering, Phillips Hall.

Master of Engineering (Electrical) Degree Program

The degree of Master of Engineering (Electrical) prepares the student either for professional work in this area of engineering or for more advanced graduate study in the doctoral program. The Master of Engineering differs from the Master of Science degree program mainly in its emphasis, which is on design capability rather than basic research. The 30-credit curriculum includes two two-term course sequences in electrical engineering, and the design project, which alone may account for 3 to 10 credits. General admission and degree requirements are described in the college's introductory section.

Geological Sciences

D. L. Turcotte, chairman; S. B. Bachman, W. A. Bassett, J. M. Bird, A. L. Bloom, L. D. Brown, J. L. Cisne, A. K. Gibbs, B. L. Isacks, D. E. Karig, S. Kaufman, R. W. Kay, J. E. Oliver, F. H. T. Rhodes, E. A. Robinson, 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, or 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.

For students in the College of Engineering who plan to enter the upperclass Field Program in Geological Sciences, it is recommended that certain courses be taken during the freshman and sophomore years. These are Geological Sciences 101 and 102, Chemistry 208, and, for those interested in geobiology, Biological Sciences 101-103 and 102-104. The upperclass curriculum (as it applies to students who are following Course Program A for the Bachelor of Science degree) is outlined below.

Term 5	Credits
Geol 355, Mineralogy	4
Geol 376, Sedimentology and Stratigraphy	4
Required science course	3 or 4
Liberal studies elective	3
Technical or free elective	3 or 4
Term 6	
Geol 356, Petrology and Geochemistry	4
Geol 325, Structural Geology and Sedimentation	4
Required science course	3 or 4
Liberal studies elective	3
Geol 704, Western Field Course	6
or	
Technical or free elective	3 or 4

A summer field course is required unless approval for an alternative field experience is granted.

Term 7

Geology elective, 300 or 400 level	3 or 4
Required science course	3 or 4
Liberal studies elective	3
Technical or free elective	3 or 4

Term 8

Geol 388, Geophysics and Geotectonics	4
Required science course	3 or 4
Liberal studies elective	3
Technical or free elective	3 or 4
Free elective	3 or 4

Students intending to specialize in *geophysics* should select their *required sciences* from the following courses or their equivalents:

Math 421–422–423, Applicable Mathematics
T&AM 310–311, Advanced Engineering Analysis I and II
A&EP 355, Intermediate Electromagnetism
A&EP 333, Mechanics of Particles and Solid Bodies
A&EP 356, Intermediate Electrodynamics
A&EP 434, Continuum Physics
Phys 410, Advanced Experimental Physics
T&AM 450, Introduction to Continuum Mechanics

Students intending to specialize in *geochemistry* (including petrology and mineralogy) should select their *required sciences* from the following courses or their equivalents:

Chem 287–288, Introductory Physical Chemistry
Chem 300, Introductory Quantitative Analysis
Chem 301, Experimental Chemistry I
Chem 302, Experimental Chemistry II
Chem 303, Experimental Chemistry III
Chem 357–358, Introductory Organic Chemistry
Chem 389–390, Physical Chemistry I and II
MS&E 331, Structure and Properties of Materials
MS&E 335, Thermodynamics of Condensed Systems

Students intending to specialize in *geobiology* should select their *required sciences* from the following courses or their equivalents:

Bio S 310, Invertebrate Zoology
Bio S 330–331, Principles of Biochemistry
Bio S 241, Plant Biology
Bio S 448, Plant Evolution and the Fossil Record
Bio S 360, General Ecology
Bio S 274, The Vertebrates
Bio S 477, Organic Evolution
Bio S 281, Genetics
Chem 253, Elementary Organic Chemistry

Students who want to pursue further training or immediate employment in *applied geology* (environmental and engineering geology; ground water; petroleum geology; or geological engineering) should select their *required sciences* from the following courses or their equivalents, with two of the four from the same field:

Agron 301, Identification, Appraisal, and Geography of Soils
Agron 701, Soil Chemistry
Agron 607, Soil Physics
CEE D301, Introductory Soil Mechanics
CEE D606, Foundation Engineering
CEE A685, Physical Environment Evaluation
MS&E 331, Structure and Properties of Materials
MS&E 366, Mechanical Properties of Materials
CEE C301, Fluid Mechanics I
CEE C302, Hydraulic Engineering
CEE E301, Environmental Quality Engineering
Math 421–422–423, Applicable Mathematics
OR&IE 260, Introductory Engineering Probability
OR&IE 370, Introduction to Statistical Theory with Engineering Applications

Students intending to specialize in *economic geology*, or pursue careers in the mining industries or mineral exploration, should consider taking economics courses as liberal studies electives and should select their *required sciences* from the group of courses composed of those listed above for geochemistry and applied geology plus the following additional courses:

CEE E611, Aquatic Chemistry
CEE D711, Rock Engineering

Students who want a more general background, or who want to remain uncommitted with regard to specialty, must choose at least two of the four required science courses from the same field, and all four required science courses must be at the 300 level or above. The technical electives may be chosen from offerings in geological sciences or in other science or engineering fields, and may be courses also approved as required sciences. Outstanding students may request substitution of an honors thesis for a fourth-year technical elective.

Students intending to pursue graduate study in geology are reminded that many graduate schools require proficiency in reading the scientific literature in one or two of the three languages French, German, or 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

Bachelor of Science Curriculum

No particular engineering core science is required for entry into the upperclass Field Program in Materials Science and Engineering. The basic upperclass curriculum, which includes the required field courses, is given below. The sequence of the courses may vary, however, in accordance with the plan worked out by each student in consultation with his or her faculty adviser.

Term 5	Credits
MS&E 331, Structure and Properties of Materials	4
MS&E 333, Research Involvement I or a Field-approved option elective*	3
MS&E 335, Thermodynamics of Condensed Systems	3
Free elective	3
Liberal studies elective	3
Term 6	
MS&E 332, Electrical and Magnetic Properties of Materials	3
MS&E 333, Research Involvement I or a field-approved option elective*	3
MS&E 336, Kinetics, Diffusion, and Phase Transformation	3
Free elective	3
Liberal studies elective	3
Term 7	
MS&E 441, Microprocessing of Materials	3
MS&E 443, Senior Materials Laboratory I	3
MS&E 445, Mechanical Properties of Materials	3
Technical elective	3
Liberal studies elective	3
Term 8	
MS&E 442, Macroprocessing of Materials	3
MS&E 444, Senior Materials Laboratory II	3
MS&E 446, Current Topics in Materials	3
Technical elective	3
Liberal studies elective	3

*The Research Involvement option gives undergraduates the opportunity to work with faculty members and their research groups on current projects. The alternative option elective provides students interested in industrial careers an additional opportunity to broaden their engineering education.

Master of Engineering (Materials) Degree Program

Students who have completed a four-year undergraduate program in engineering or the physical sciences are eligible for consideration for admission to the M.Eng. (Materials) program, which includes the following:

- 1) A project qualifying for at least 12 credits and requiring individual effort and initiative. This project, carried out under the supervision of a member of the faculty, is usually experimental, although it can be analytical.
- 2) Six credits of courses in mathematics or applied mathematics. This requirement may be satisfied by courses T&AM 310 and 311; students who have previously completed these must select other courses acceptable to the faculty.
- 3) Courses in materials science and engineering selected from any of those offered at the graduate level, or other courses approved by the faculty, required to bring the total credits to 30.

General admission and degree requirements are described in the introductory section under "College of Engineering."

Mechanical and Aerospace Engineering

A. R. George, director; J. F. Booker, associate director; P. L. Auer, C. T. Avedisian, D. L. Bartel, A. H. Burstein, D. A. Caughey, B. J. Conta, 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 of 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 this basic branch of engineering, as well as an introduction to the many professional and technical areas with which mechanical engineering is particularly concerned. Two main areas of concentration, corresponding to the two major streams of mechanical engineering technology, are offered in the field program.

Mechanical systems and design treats the design, analysis, testing, and manufacture of machinery, vehicles, devices, and systems. Particular areas of concentration include mechanical design and analysis, computer-aided design, vehicle engineering, vibrations and control systems, and manufacturing engineering.

Engineering of energy and fluid systems has as its main concerns the development of fossil, solar, and other energy sources for uses such as electric power generation, industry, and terrestrial and aerospace transportation; the use of heating, air conditioning, refrigeration, and noise and pollution control techniques to modify the human environment; and theoretical and experimental aspects of heat transfer and fluid flow.

The field program is open to students who have taken Mechanics of Solids (T&AM 202 or Engineering 202) during the sophomore year. It is recommended that students who definitely intend to major in mechanical engineering also take Dynamics (T&AM 203 or Engineering 203) and Thermodynamics (M&AE 221 or Engineering 221), which are both required for the

field program. Another course required for the field program that can be taken during the sophomore year is Introduction to Electrical Systems (Electrical Engineering 210 or Engineering 210). Also, a student who takes Introduction to Mechanical Properties of Materials (MS&E 261 or Engineering 261) in the Division of Basic Studies need not necessarily take M&AE 311, Materials and Manufacturing Processes, which is normally part of the field program.

The twelve courses required for the Field Program in Mechanical Engineering are included in the sample curriculum outlined below. It should be noted that this is a curriculum suggested for a minimally prepared student. If some of the field requirements have been fulfilled in the Division of Basic Studies as recommended, certain electives may be substituted for them. It should also be noted that if prerequisites are met, most of the listed courses may be taken during terms different from those in the sample curriculum.

<i>Term 5 (Sample Curriculum)</i>	<i>Credits</i>
T&AM 203, Dynamics	3
M&AE 221, Thermodynamics	3
M&AE 311, Materials and Manufacturing Processes	3
Mathematics elective	3
Liberal studies elective	3
<i>Term 6 (Sample Curriculum)</i>	
M&AE 325, Mechanical Design and Analysis	4
M&AE 323, Fluid Mechanics	4
Ele E 210, Introduction to Electrical Systems	3
Field elective	3
Liberal studies elective	3
<i>Term 7 (Sample Curriculum)</i>	
M&AE 324, Heat Transfer and Transport Processes	3
M&AE 326, Systems Dynamics	4
M&AE 327, Mechanical Engineering Laboratory	4
Technical elective	3
Liberal studies elective	3
<i>Term 8 (Sample Curriculum)</i>	
Field elective	3
Technical elective	3
Free elective	3
Free elective	3
Liberal studies elective	3

The mathematics elective is chosen from an approved list. The two field electives are selected from upperclass courses offered in mechanical and aerospace engineering.

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, and 536. Students may prepare for the graduate program in aerospace engineering by majoring in mechanical engineering, in other appropriate engineering specialties such as electrical engineering or engineering physics, or in the physical sciences. Other subjects recommended as preparation for graduate study include thermodynamics, fluid mechanics, applied mathematics, chemistry, and physics.

Master of Engineering (Aerospace) Degree Program

The Master of Engineering (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 four 3-credit core courses.

<i>Core Courses Available</i>	<i>Credits</i>
M&AE 459, Plasma Energy Systems	3
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 543, Combustion Processes	3
M&AE 569, Mechanical and Aerospace Structures I	3
M&AE 570, Mechanical and Aerospace Structures II	3
M&AE 601, Foundations of Fluid Dynamics and Aerodynamics	3
M&AE 602, Incompressible Aerodynamics	3
M&AE 603, Compressible Aerodynamics	3
M&AE 608, Physics of Fluids I	3
M&AE 609, Physics of Fluids II	3
M&AE 610, Gasdynamics	3
M&AE 630, Atmospheric Turbulence and Micrometeorology	3
M&AE 648, Seminar on Combustion	3
M&AE 653, Experimental Methods in Fluid Mechanics and Combustion	3
M&AE 704, Theory of Viscous Flows	3
M&AE 707, Aerodynamic Noise Theory	3
M&AE 734, Turbulence and Turbulent Flow	3
M&AE 737, Numerical Methods in Fluid Flow and Heat Transfer	3

Also required are 6 credits of elective subjects. 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 415–416 or the equivalent), participation in the weekly colloquium (1 credit each term), one advanced seminar (2 credits), and one professional design project (2 credits). This makes a total of 30 credits.

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 finite element and numerical methods. Professional design projects may be arranged in any of these areas.

Master of Engineering (Mechanical) Degree Program

The Master of Engineering (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 bioengineering, machine dynamics and control, mechanical analysis and development, vehicles and propulsion, propulsion engines, energy systems, thermal environment, manufacturing engineering, and materials removal. An individual student's curriculum includes a 6-credit design project, a major consisting of a minimum of 12 credits, and sufficient technical electives to meet the degree requirement of 30 credits.

The design project, which may be undertaken individually or by a small team, is a significant part of the program. Although "design" is interpreted broadly, the project should clearly involve the creation and evaluation of alternative solutions to an engineering problem. Each student chooses a project from a list of those offered by the faculty or proposes a project and finds a faculty member who will agree to serve as adviser. Some recent projects have been concerned with the design and analysis of crankshaft and crankcase structures, the thermal design of spacecraft components, the design of orthopedic implants, the University's energy policy, energy self-sufficiency, a new type of wind turbine, pollution control in automobile engines, motorcycle suspensions, and the analysis and design of flywheel-internal combustion engine hybrid drives for short-range cars.

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 of Mechanical and Aerospace Engineering. 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 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 A&EP 303 and 304, Introduction to Nuclear Science and Engineering I

and II, plus two of the four courses A&EP 612, A&EP 651, A&EP 633, and A&EP 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 degree of Master of Engineering (Nuclear) 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 Reactor 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
Ele E 681, Introduction to Plasma Physics
Ele E 682, Advanced Plasma Physics
Ele E 671-672, Feedback 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
NS&E 605, Interaction of Radiation and Matter
Chem E 627, Nuclear and Reactor Engineering
MS&E 705, The Effects of Radiation on Materials

Operations Research and Industrial Engineering

G. L. Nemhauser, director; L. E. Trotter, Jr., associate director; L. J. Billera, graduate faculty representative; J. A. Muckstadt, M. Eng. faculty representative; R. E. Bechhofer, R. G. Bland, J. A. Bloom, D. C. Heath, P. L. Jackson, W. F. Lucas, W. L. Maxwell, N. U. Prubhu, T. J. Santner, L. W. Schruben, M. S. Taqqu, H. M. Taylor 3d, M. J. Todd, B. W. Turnbull, L. I. Weiss

Bachelor of Science Curriculum

The program is designed to provide a broad and basic education in the techniques and modeling concepts needed to analyze and design complex systems, and an introduction to the technical and professional areas with which operations researchers and industrial engineers are concerned.

During the sophomore year, a student who plans to enter the Field Program in Operations Research and Industrial Engineering must take Introductory Engineering Probability (OR&IE 260 or Engineering 260). Other recommended courses are Introduction to Electrical Systems (Electrical Engineering 210 or Engineering 210); Mechanics of Solids (T&AM 202 or Engineering 202); and Computers and Programming (Computer Science 211 or Engineering 211). Early consultation with an OR&IE faculty member or with the associate director can be helpful in making appropriate choices. In the junior year the following courses are required:

Term 5	Credits
OR&IE 320, Optimization I	4
OR&IE 350, Cost Accounting, Analysis, and Control	4
OR&IE 370, Introduction to Statistical Theory with Engineering Applications	4
Com S 211, Computers and Programming*	3
Liberal studies elective	3
Term 6	
OR&IE 321, Optimization II	4
OR&IE 361, Introductory Engineering Stochastic Processes	4
Technical elective	3
Behavioral science†	3
Liberal studies elective	3

*If Computer Science 211 is completed during the sophomore year, an appropriate 3-credit technical elective must be substituted.

†The behavioral science requirement can be satisfied by any one of several courses of an advanced nature, including B&PA 540 (recommended for those contemplating the pursuit of a graduate business degree), B&PA 541, Hotel Administration 211, I&LR 120, 121, 150, 151, 260, and 320. The adviser must approve the selection in all cases.

The basic senior-year program, from which individualized programs are developed, comprises the following courses:

	Minimum credits
OR&IE 580, Digital Systems Simulation	4
Four courses consisting of sequences as described below	12
Technical elective	3
Two liberal-studies electives	6
Two free electives	6

Available OR&IE sequences are as follows:

Industrial systems: two or four courses selected from OR&IE 410, 417, 421, and 562*, and B&PA NBA 562
Optimization methods: OR&IE 431 and 435
Applied probability and statistics: two or four courses selected from OR&IE 462, 471, 472, 561, 563, and 570

Students who want to apply OR&IE methodology in other technological areas may substitute one course sequence appropriate to the outside discipline for one of the required OR&IE sequences. Examples of possible sequences outside OR&IE can be obtained from the school office and must be approved by the adviser.

These options, together with an appropriate choice of technical electives, enable a student to earn at least

*OR&IE 410 and 421 must be selected by students who plan to participate in the cooperative program with the Graduate School of Business and Public Administration.

12 credits in a technological field other than OR&IE. Through an appropriate choice of free electives also, as many as 18 credits can be earned in the secondary discipline.

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 Master of Engineering (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.

Two sample course programs leading to the Master of Engineering (OR&IE) degree are outlined below.

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, Mathematical Models—Development and Application	4
OR&IE 580, Digital Systems Simulation	4
OR&IE 893, Applied OR&IE Colloquium	1
OR&IE 599, Project	1
Two technical electives	6

Spring term

OR&IE 551, Advanced Engineering Economic Analysis	4
OR&IE 894, Applied OR&IE Colloquium	1
OR&IE 599, Project	minimum of 4
Two technical electives	6

The electives specified above will normally be chosen from graduate courses offered by the School of Operations Research and Industrial Engineering.

II. For matriculants from other fields who minimally fulfill the prerequisite requirements. Students who have the equivalent of OR&IE 370, 622, and 623 will take technical electives in their place.

Fall term	Credits
OR&IE 370, Introduction to Statistical Theory with Engineering Applications	4
OR&IE 622, Operations Research I	3
OR&IE 516, Mathematical Models—Development and Application	4
OR&IE 580, Digital Systems Simulation	4
OR&IE 893, Applied OR&IE Colloquium	1
OR&IE 599, Project	1

Spring term

OR&IE 623, Operations Research II	3
OR&IE 551, Advanced Engineering Economic Analysis	4
OR&IE 894, Applied OR&IE Colloquium	1
OR&IE 599, Project	minimum of 4
Technical elective	3

Students fulfill the project requirement by working as part of a group of no more than four students on an operational systems problem that actually exists in some organization. Appropriate problems are suggested by various operating organizations such as manufacturing firms, retailing organizations, service organizations, government agencies, and educational institutions.

Cooperative Program with Business and Public Administration

Undergraduates majoring in operations research and industrial engineering may be interested in a cooperative program at Cornell that leads to both Master of Engineering and Master of Business Administration 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 Master of Business Administration degree. (This is because modern management is concerned with the operation of production and service systems, and much of the analytical methodology required to deal with operating decisions is the same as that used by systems engineers in designing the systems.) Getting started early on meeting the business-degree requirements permits students accepted into the cooperative program to earn both the Master of Engineering (OR&IE) and Master of Business Administration 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 NBP 503, Business Policy.
- 2) A maximum of 30 credits toward the M.B.A. degree can be earned for courses taken before the start of the sixth year; these credits may be earned in the undergraduate B.S. program, in the M.Eng. program, or in the School of Business and Public Administration.
- 3) During the sixth year, over a period of two semesters, the candidate earns 26 credits in elective courses approved by the business school, plus 4 credits for NBP 503, Business Policy.

In accordance with this plan, the candidate would qualify for the Bachelor of Science degree at the end of four years, Master of Engineering (OR&IE) degree at the end of five years, and the Master of Business Administration 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, P. A. Dashner, E. W. Hart, P. J. Holmes, C. Y. Hui, J. T. Jenkins, R. H. Lance, G. S. S. Ludford, Y. H. Pao, S. Mukherjee, R. H. Rand, A. L. Ruina, W. H. Sachse

Undergraduate Study

The Department of Theoretical and Applied Mechanics is responsible for courses in engineering mechanics and engineering mathematics, some of which are part of the underclass engineering curriculum in the Division of Basic Studies.

College Program in Engineering Science

Although no upperclass field program is offered by the Department of Theoretical and Applied Mechanics, a student may enroll in the College Program in Engineering Science, which is sponsored by the department. The College Program is described in the college's introductory section.

Engineering Basic Studies Courses

Courses taken through the Division of Basic Studies include the following engineering basic studies and, in addition, courses offered by various schools and departments of the College of Engineering and the College of Arts and Sciences.

105 Introduction to Computer Programming Fall or spring. 4 credits. The course content of Engineering 105 is the same as that of Computer Science 100.

2 lec/s, 1 rec (optional), 3 evening exams, final exam.

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 PL/I; FORTRAN is introduced and used for final problems. The course does not presume previous programming experience. An introduction to numerical computing is included, although no college-level mathematics is presumed. Programming assignments are tested and run on interactive, stand-alone microcomputers.

[106 Engineering Perspectives] 3 credits. Discontinued after spring 1981.]

111 or 110 Mass and Energy Balances (also Chem E 111 or 110) 111, fall; 110, summer. 3 credits. Prerequisites: one year of freshman chemistry. 111 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. Chemical Engineering 110 differs from 111 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 110 is evaluated by nine tests, two preliminary examinations, and a final examination; superior students may earn exemption from the final examination.

202 Mechanics of Solids (also T&AM 202) Fall or spring. 3 credits. Prerequisite: coregistration in Mathematics 293.

2 lec/s, 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 (also T&AM 203) Fall or spring. 3 credits. Prerequisite: coregistration in Mathematics 294.

2 lec/s, 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.

206 The Physics of Life (also A&EP 206) Fall. 3 credits. Prerequisite: concurrent registration in Physics 213 or permission of instructor.

3 lec/s. A. Lewis.

An in-depth study of four biological topics from a physical point of view. Topics covered are photosynthetic conversion of light into chemical energy, proteins as transport and production machines, membranes, and biophysical aspects of replication. Topics are chosen to illustrate the unity and interdependence of living matter.

210 Introduction to Electrical Systems (also Ele E 210) Fall or spring. 3 credits. Prerequisites: Mathematics 192 and Physics 112.

3 lec-rec.

Circuit elements and laws, natural response of linear systems; impedance and pole-zero concepts; complex frequency and phasors; forced response and power systems; transfer function and frequency response; low-frequency terminal characteristics of diodes, triodes, and transistors; linear models of electronic devices; bias circuits and frequency response of amplifiers; operational amplifiers, feedback, and oscillators.

211 Computers and Programming (also Com S 211) Fall or spring. 3 credits. Prerequisite: Computer Science 100 or 105 or equivalent programming experience.

2 lec/s, 1 rec.

Intermediate programming in a high-level language and introduction to computer science. Topics include program development, invariant relations, block structure, recursion, parallel processing, data structures, analysis of algorithms, and a brief introduction to machine architecture and machine-level programming. PL/I is the principal programming language used.

217 The Physics of Energy (also A&EP 217) Spring. 3 credits. Prerequisite: Physics 213.

2 lec/s, 1 rec-lab. T. N. Rhodin.

The basic physical principles and the fundamental engineering problems associated with present and potential approaches to large-scale energy conversion. In particular, the basic principles and fundamental limitations of the use of nuclear energy (both fission and fusion) and solar energy are presented. One objective of the course is to give a current view of the present status and future directions of research and development in energy-related phenomena.

221 Thermodynamics (also M&AE 221) Fall or spring. 3 credits. Prerequisites: Mathematics 191-192 and Physics 112.

3 rec/s.

The definitions, concepts, and laws of thermodynamics. Applications to ideal and real gases, multiphase pure substances, gaseous mixtures, and gaseous reactions. Heat-engine and heat-pump cycles. An introduction to statistical thermodynamics.

230 Introduction to Digital Systems (also Ele E 230) Fall or spring. 3 credits.

2 lec/s, 5 lab experiments.

Introduction to basic analysis and design techniques and methodology of digital and computer systems. Boolean algebra; integrated circuit components used in digital-system implementation; codes and number systems; logic design of combinational circuits; logic design of sequential circuits; microprocessors and microcomputers; application of microprocessors and microcomputers to digital system design.

260 Introductory Engineering Probability (also OR&IE 260) Fall or spring. 3 credits. Prerequisite: first-year calculus.

3 lec/s.

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, Stochastic Processes I, or by OR&IE 370, Statistics. 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 (also MS&E 261) Fall or spring. 3 credits. 2 lec, 1 rec or lab.

The relation of mechanical properties to microscopic structures and defects inside metals and other materials. Deformation of rubber-like polymers. Permanent changes in the shape of crystals caused by the action of stresses. Effect of movement of atoms on the strength of solids at high temperatures. Manipulation of microscopic structure for high strength. Fracture and fatigue failure.

262 Introduction to Electrical Properties of Materials (also MS&E 262) Spring. 3 credits. 2 lec, 1 rec or lab.

Electronic structure of atoms, molecules, and crystalline solids. Electrical conductivity and other electrical properties of metals, semiconductors, and insulators. Semiconductors and their applications in electronic devices. Magnetism and magnetic materials. Introduction to lasers.

270 Basic Engineering Probability and Statistics (also OR&IE 270) Fall or spring. 3 credits. Students who intend to enter the upperclass Field Program in Operations Research and Industrial Engineering should take OR&IE 260 instead of this course. Prerequisite: first-year calculus.

3 lec.
At the end of this course a student should command a working knowledge of basic probability and statistics as they apply to engineering work. For students who want to have greater depth in probability and statistics, a course in probability (OR&IE 260) followed by a course in statistics (OR&IE 370) is recommended.

321 Numerical Methods (also Com S 321) Fall or spring. 4 credits. Prerequisites: Mathematics 293 or 221 and knowledge of FORTRAN equivalent to what is taught in Com S 100.

3 lec.
Students solve representative problems by programming appropriate algorithms and using library programs. Numerical methods for systems of linear equations, interpolation, integration, ordinary differential equations, nonlinear equations, optimization and linear least squares.

Applied and Engineering Physics Courses

206 The Physics of Life (also Engr. 206) Fall. 3 credits. Prerequisite: concurrent registration in Physics 213 or permission of instructor. 3 lec, 1 lab. See description under Engineering Basic Studies.

217 The Physics of Energy (also Engr 217) Spring. 3 credits. Prerequisite: Physics 213. 2 lec, 1 rec-lab. T. N. Rhodin. See description under Engineering Basic Studies.

303 Introduction to Nuclear Science and Engineering I 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 lec. D. D. Clark.
Introductory overview of atomic and nuclear physics, nuclear structure, radioactivity, nuclear reactions, interaction of radiation with matter; reactor physics: neutron moderation, neutron diffusion, the steady-state chain reaction, reactor kinetics. At the level of *Introduction to Nuclear Engineering* by Lamarsh.

304 Introduction to Nuclear Science and Engineering II Spring. 3 credits. Prerequisite: A&EP 303.

3 lec. D. A. Hammer.
Reactor engineering: heterogeneous reactors, dynamic behavior and control, heat transfer; overview of controlled fusion: fuel cycles, reactor configurations, engineering problems; radiation: biological effects, shielding, radiation protection, damage and materials problems; reactor safety, licensing, and siting.

333 Mechanics of Particles and Solid Bodies Fall. 4 credits.

3 lec, 1 rec. B. Kuske.
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 216 and coregistration in Mathematics 421 or T&AM 610, or permission of instructor.

D. Hammer.
Topics: vector calculus; electrostatics, magnetostatics, and introduction phenomena; Laplace's equation solutions in Cartesian, cylindrical, and spherical systems; dielectrics, paramagnetic and diamagnetic materials, electric and magnetic forces, energy storage, skin effect, quasistatics. Emphasis on physical concepts and applications.

356 Intermediate Electrodynamics Spring. 4 credits. Prerequisites: A&EP 355, coregistration in Mathematics 422 or T&AM 611, or permission of instructor.

R. V. Lovelace.
Development of electromagnetic wave phenomena and radiation. Topics include transmission lines, waveguides, wave properties of dispersive media, radiation and scattering phenomena, reciprocity, physical optics, and special relativity.

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 lec, 1 rec. V. 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 or spring. 4 credits. Prerequisite: Physics 208 or 213 or permission of instructor; no previous experience with electronics is assumed.

1 sec, 2 labs. Spring: A. Kuckes.
This laboratory course focuses on designing, building, and testing analog, digital, and microprocessor-based circuits that are useful in electronic instrumentation. Analog topics treated 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 build digital circuits that incorporate Schmidt triggers, comparators, combinatorial and sequential logic using

medium-scale integrated circuits. The above circuits are also interfaced to a microprocessor whose architecture, machine instruction set, and programming principles are studied. At level of *Principles of Electronic Instrumentation* by Diefenderfer.

401 Physics of Atomic and Molecular Processes Fall. 3 credits. Prerequisite: A&EP 361 or Physics 443, or permission of instructor.

T. A. Cool.
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 lec, 1 rec. B. R. Kuske.
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. Prerequisite: A&EP 333 or equivalent.

M. Nelkin.
Linear elasticity theory; tensor and vector formalisms; elementary engineering applications, crystal anisotropy, dislocations. Elastic and inelastic waves. Hydrodynamics; Navier-Stokes equations, ideal and viscous fluids, compressible and incompressible flows; elementary applications, lift, drag, convection, surface waves, simple shocks, sound, introduction to linear response theory, dimensional analysis, instabilities and turbulence, subcritical and supercritical flows.

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.

601 Photosynthesis (also Biological Sciences 445) Fall. 3 credits. Prerequisites: Chemistry 104 or 208, Mathematics 106 or 111, and Physics 102 or 208, or permission of instructor. Offered alternate years.

R. K. Clayton.
A detailed study of the process by which plants use light in order to grow, emphasizing physical and physicochemical aspects.

606 Introduction to Plasma Physics (also Electrical Engineering 681) Fall. 3 credits. Prerequisites: A&EP 355, 356, or equivalent. Open to fourth-year students at discretion of instructor.

3 lec. R. N. Sudan.
Plasma state; motion of charged particles in fields; collisions, coulomb scattering; transport coefficients, ambipolar diffusion, plasma oscillations and waves; hydromagnetic equations; hydromagnetic stability and microscopic instabilities; test particle in a plasma; elementary applications.

607 Advanced Plasma Physics (also Electrical Engineering 682) Spring. 3 credits. Prerequisite: A&EP 606.

3 lec. R. N. Sudan.
Boltzmann and Vlasov equations; waves in hot plasmas; Landau damping, micro-instabilities; drift waves, low-frequency stability, collisional effects; method of dressed test particles; high-frequency conductivity and fluctuations; neoclassical toroidal diffusion, high-powered beams.

608 Plasma Astrophysics (also Astronomy 660)

Spring. 2 credits.

R. V. Lovelace.

Selected topics discussed in detail: (a) the solar corona and the solar wind; (b) hydrodynamic and magnetohydrodynamic flows around compact objects in galactic nuclei; (c) global electrodynamics of double radio sources.

609 Low-Energy Nuclear Physics Fall. 4 credits.

Prerequisite: an introductory course in modern physics, including quantum mechanics.

3 lecs. V. Kostroun.

The nuclear interaction. Properties of ground and excited states of nuclei; models of nuclear structure; alpha, beta, gamma radioactivity, low-energy nuclear reactions—resonant and nonresonant scattering, absorption, and fission. At the level of *Introduction to Nuclear Physics* by Engle.

611 Vision (also Biological Sciences 395) Fall.

3 credits. Prerequisites: Chemistry 104 or 208, Mathematics 106 or 111, Physics 102 or 208, or permission of instructor. Offered alternate years.

R. K. Clayton.

Study of the mechanisms of seeing, embracing biological, physical, and chemical approaches to the subject.

612 Nuclear Reactor Theory I Fall. 4 credits.

Prerequisites: a year of advanced calculus and some nuclear physics.

3 lecs. K. B. Cady.

Physical theory of fission reactors. Fission and neutron interactions with matter; theory of neutron diffusion; slowing down, and thermalization; calculations of criticality and neutron flux distribution in nuclear reactors. Reactor kinetics. At the level of *Nuclear Reactor Theory* by Lamarsh.

613 Nuclear Reactor Theory II Spring. 3 credits. A

continuation of A&EP 612, primarily intended for students planning research in nuclear reactor physics and engineering. Prerequisite: A&EP 612.

3 lecs. K. B. Cady.

The Boltzmann linear transport equation, its adjoint, and their approximate solutions are developed and applied to the heterogeneous neutron chain reactor.

[614 Special Topics in Biophysics] Offered alternate years. Not offered 1981–82.

W. W. Webb.

Topics, credits, and schedule to be announced. Seminars on selected topics of current interest in biophysics research.]

[615 Membrane Biophysics] Spring. 3 credits. Not offered 1981–82.

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. 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 Structure Determination (parallels Physics 464)

Spring. 3 credits. Prerequisite: permission of instructor or a course in quantum mechanics. Intended for advanced undergraduates and 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.

[619 Molecular Energy Transfer] Spring. 3 credits. Offered alternate years. Not offered 1981–82.

T. A. Cool.

Fundamentals of energy transfer by molecular collisions in gases. Energy-transfer mechanisms in molecular and chemical lasers. Processes for interconversion of electronic, vibrational, rotational, and translational energy. Intermolecular potential, dispersion forces, multipole moment interactions, repulsive forces. Energy transfer at surfaces.]

[622 Electron Optics] Spring. 3 credits. Offered alternate years. Not offered 1981–82.

M. S. Isaacson.

Basic electron optics with emphasis on the fundamental principles of the production and focusing of charged particle beams. Special consideration is given to the optics appropriate for beam transport and probe forming systems and systems useful in materials characterization. Included are discussions of the calculation of trajectories in multicomponent optical systems, comprehensive treatments of optical aberrations, and practical considerations of electron optical design.]

633 Nuclear Engineering Fall. 4 credits.

Prerequisite: introductory course in nuclear engineering.

K. B. Cady.

The fundamentals of nuclear reactor engineering; reactor siting and safety, fluid flow and heat transfer, control, and radiation protection.

634 Nuclear Engineering Design Seminar

Spring. 4 credits. Prerequisite: A&EP 633.

K. B. Cady.

A group design study of a selected nuclear system. Emphasis is on safety, siting, and radiation protection in the design of nuclear systems.

[636 Seminar on Thermonuclear Fusion Reactors] Fall. 3 credits. Prerequisite: basic course

in plasma physics or nuclear reactor engineering, or permission of instructor. Not offered 1981–82. 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: Electrical Engineering 681, 682, and 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 2½-hour afternoon periods plus 1 lec. Staff. Lectures on interaction of radiation with matter, radiation biology, and nuclear instruments and measurements. Fifteen experiments are available (from which eight are selected) on nuclear physics, radiation instrumentation and measurements, activation analysis, neutron moderation, and reactor

physics and engineering; the subcritical reactor assembly and TRIGA reactor are used. At the level of *Nuclear Radiation Detection* by Price and *Radiation Detection and Measurement* by Knoll.

652 Advanced Nuclear and Reactor Laboratory

Spring. 3 credits. Prerequisites: A&EP 651 and 609 or 612. Offered on independent study basis or, with sufficient demand, as a formal course.

Two 2½-hour afternoon periods.

Laboratory experiments and experimental methods in nuclear physics and reactor physics. Ten experiments are available, some using the Zero Power Reactor critical facility.

661 Microcharacterization Fall. 3 credits.

Prerequisites: Physics 112, 213, and 214, or an introductory course in modern physics.

M. Isaacson.

The basic physical principles underlying the many modern microanalytical techniques available for characterizing materials. Discussion centers on the physics of the interaction process by which the characterization is performed, the advantages and limitations of each technique, and the instrumentation involved in each characterization method (including the charged-particle optics when appropriate).

662 Microprocessing of Materials Spring. 3 credits.

R. A. Buhrman.

An introduction to the fundamentals of fabricating and patterning thin-film materials and surfaces, with emphasis on electronic materials. Vacuum and plasma thin-film deposition processes. Photon, electron, x-ray, and ion-beam lithography. Techniques for pattern replication by plasma and ion processes. Emphasis is on understanding the physics and material 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.

[705 Topics in Statistical Physics] 3 credits.

Prerequisite: general familiarity with statistical mechanics. Offered alternate years. Not offered 1981–82.

M. S. Nelkin.

Selected topics of current interest in statistical physics. For example, a recent subject was the variety of anti-intuitive behavior exhibited by nonlinear macroscopic systems driven far from equilibrium; examples were taken primarily from turbulent fluid flow.]

[711 Principles of Diffraction (also MS&E 610)]

Fall. 3 credits. Offered alternate years. Not offered 1981–82.

B. W. Batterman.

Introduction to diffraction phenomena as applied to solid-state problems. Scattering and absorption of neutrons, electrons, and X-ray beams. 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.]

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 or 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 Electrical Engineering 781) Fall. 3 credits. Prerequisites: Electrical Engineering 407 or Physics 561 or permission of instructor. Offered alternate years.
2 lecs. R. L. Liboff.

See Electrical Engineering 781 for course description.

762 Physics of Solid Surfaces and Interfaces (also MS&E 703) Spring. 3 credits. Lecture course primarily for graduate and qualified senior students. Prerequisites: Physics 454 and A&EP 361. Offered alternate years.

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 Courses

101 Nonresident Lectures Fall. Noncredit.
1 lec.

Given by lecturers invited from industry and from selected departments of the University to assist students in their transition from college to industrial life.

110 Mass and Energy Balances (also Engr 110) Summer. Not offered during the academic year; available during summer. 3 credits. Prerequisite: one year of freshman chemistry. Chemical Engineering 110 is intended for students who cannot take Chemical Engineering 111.

R. G. Thorpe.
Self-paced audiovisual instruction in the material of Chemical Engineering 111. See description under Engineering Basic Studies.

111 Mass and Energy Balances (also Engr 111) Fall. 3 credits. Prerequisite: one year of freshman chemistry or permission of instructor.
3 lecs, 1 computing session. R. G. Thorpe.
See description under Engineering Basic Studies.

311 Chemical Engineering Thermodynamics I Fall. 3 credits.
3 lecs, 1 computing session. W. B. Streett.
A study of the first and second laws, with application to batch and flow processes. Thermodynamic properties of fluids; applications of thermodynamics to compressors, power cycles, refrigeration; thermodynamic analysis of processes.

312 Chemical Engineering Thermodynamics II Spring. 3 credits.
3 lecs, 1 computing session. K. E. Gubbins.
Thermodynamics of mixtures; phase equilibria and phase diagrams. Estimation methods. Heat effects; chemical equilibria.

321 Materials Spring. 3 credits. Prerequisite: MS&E 261 or equivalent, or permission of instructor.
3 lecs. G. G. Cocks.
Practical aspects of materials: extractive metallurgy, forming and fabrication of metals, some useful alloys, ceramic materials, refractories, selection of materials, and behavior of materials under service conditions.

410 Reaction Kinetics and Reactor Design Fall. 3 credits. Prerequisite: Chemical Engineering 430.
3 lecs. J. F. Cocchetto.
A study of chemical reaction kinetics and principles of reactor design for chemical processes.

421 Industrial Organic Chemical Processes Spring. 2 credits. Prerequisite: Chemistry 253 or 357.
2 lecs. J. C. Smith.
Study of commercial manufacturing processes for important organic chemicals.

430 Introduction to Rate Processes Fall. 3 credits. Prerequisites: Chemical Engineering 111 and engineering mathematics sequence.
3 lecs, 1 computing session. C. Cohen.
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. 3 credits. Prerequisites: Chemical Engineering 430 and familiarity with FORTRAN or PL/I.
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: Chemical Engineering 430, 431.
2 lecs, 1 lab. R. L. Von Berg 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 or spring. Credit variable. Prerequisite: Chemical Engineering 432.
Special laboratory projects involving bench-scale or pilot-plant equipment.

434 Transport Phenomena Spring. 3 credits. Strongly recommended for those interested in graduate study in chemical engineering.
3 lecs. W. L. Olbricht.
An introduction to momentum, heat, and mass transport. Development of governing equations. Solutions of problems involving laminar flow of purely viscous liquids, heat transfer, and convective diffusion.

461 Chemical Process Evaluation Fall. 3 credits. P. Harriott.
Study of some important chemical processes, covering raw material sources, analysis of reaction conditions, and product purification.

462 Chemical Process Synthesis Spring. 4 credits. Prerequisite: Chemical Engineering 432.
H. F. Wiegandt and staff.
A consideration of process and economic alternatives in selected chemical processes; design and assessment.

563 Process Equipment Design and Selection Fall. 3 credits. Prerequisite: Chemical Engineering 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. R. P. Merrill.

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: Chemical Engineering 563, 564.
Staff.
Design study and economic evaluation of a chemical processing facility, alternative methods of manufacture, raw material preparation, food processing, waste disposal, or some other aspect of chemical processing.

566 Computer-Aided Process Design Spring. 3 credits. Prerequisite: concurrent registration in 462 or a previous course in process design.
3 lecs. G. F. Scheele.
An introduction to the synthesis and use of computer systems for steady-state simulation and optimization of chemical processes.

595, 596 Special Projects in Chemical Engineering Fall or spring. Credit variable.
Research or studies on special problems in chemical engineering.

611 Phase Equilibria Fall. 3 credits. Prerequisite: physical chemistry.
3 lecs. R. G. Thorpe.
A detailed study of the pressure-temperature-composition relations in binary and multicomponent heterogeneous systems where several phases are of variable composition. Prediction of phase data.

621 Petroleum Refining Spring. 3 credits. Prerequisite: Chemical Engineering 461.
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. Not offered 1981-82.
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.]

627 Nuclear Chemical Engineering Fall. 2 credits. Prerequisite: permission of instructor.
2 lecs. R. L. Von Berg.
Uranium refining, isotope separation, fuel manufacture, spent-fuel processing, radioactive waste disposal, radiation damage, radiation chemistry.

640 Polymeric Materials Fall. 3 credits.
3 lecs. F. Rodriguez.
Chemistry and physics of the formation and characterization of polymers. Principles of fabrication.

641 Physical Polymer Science Fall. 3 credits. Prerequisite: Chemical Engineering 311, 430, or equivalent.
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: Chemical Engineering 640.
F. Rodriguez.
Experiments in the formation, characterization, fabrication, and testing of polymers.

644 Microbial Engineering Spring. 3 credits.
Prerequisites or corequisites: Chemical 288 and any course in microbiology.

2 lecs, rec. R. K. Finn.

An advanced discussion of fermentation as a unit process. Topics include sterilization, aeration, agitation, and continuous fermentation.

646 Controlled Cultivation of Microbial Cells Spring. Variable credit. Prerequisite: Microbiology 291.

R. K. Finn.

A projects course. Use of batch and continuous stirred jars to explore the physiology of microorganisms under conditions simulating industrial practice.

647 Wastewater Engineering in the Process Industries Fall. 3 credits. Prerequisites: organic and physical chemistry; Chemical Engineering 430 or equivalent.

M. L. Shuler.

Introduction to general and legal problems of pollution control, including some descriptive technology. Major emphasis, however, is on the quantitative engineering aspects of design and operation. Both biological and physical chemical methods, as they apply to the treatment of strong and special wastes from the chemical and allied industries, are discussed.

648 Polymer Processes Spring. 3 credits.

Prerequisite: 640 or permission of instructor.

3 lecs. F. Rodriguez.

Production and applications of polymers. Discussion of stabilization and degradation, including processes for recycling and disposal of plastics and related products.

651 Numerical Methods in Chemical Engineering Fall. 3 credits.

3 lecs. G. F. Scheele.

Solution of single and sets of algebraic equations, polynomial approximations, integration, initial and boundary-value ordinary differential equations, partial differential equations, statistical design of experiments.

661 Air Pollution Control Fall. 3 credits.

P. Harriott.

Origin of air pollutants, photochemical reactions in the atmosphere. Design of equipment for removal of particulate and gaseous pollutants formed in combustion and chemical processing.

671 Process Control Spring. 3 credits.

Prerequisite: Chemical Engineering 430.

3 lecs. J. F. Cocchetto.

Analysis of process dynamics and design of control schemes 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 Applied Surface Chemistry and Physics Fall. 2 credits.

R. P. Merrill.

Topics in the chemistry and physics of solid surfaces and their applications to practical problems. In 1981 the course will concentrate on the physics and chemistry of catalytic systems from a fundamental viewpoint. Discussion of several practical catalytic systems will be included.

680 Chemical Microscopy Fall. 3 credits.

1 lec, 2 labs. G. G. Cocks.

The use of the light microscope to investigate chemical problems in biological or nonbiological systems. Topics include: the optics of the microscope, types of microscopes (transmission,

reflection, polarizing, interference, phase, and dark field), the preparation of specimens, qualitative and quantitative analysis, crystallography, and photomicrography.

681 Electron Microscopy Fall. 3 credits.

Prerequisite: Chemical Engineering 680 or special permission.

1 lec, 2 labs. G. G. Cocks.

An introductory course designed to teach the student how to use the electron microscope. Topics include optics of the microscope, the use and maintenance of the microscope, specimen preparative techniques (substrates, particulates, replication, microtomy, electron diffraction, and thinning of metals), photomicrographic techniques, and the interpretation of micrographs.

682 Advanced Chemical Microscopy Spring.

Variable credit. Prerequisites: Chemical Engineering 680 and permission of instructor.

G. G. Cocks.

This is primarily a projects course and offers the student the opportunity either to learn more about microscopes and their use or to apply the techniques of microscopy to the investigation of topics or problems of special interest.

683 Laboratory in Optical Crystallography Fall.

Credit variable. This is the laboratory for Geological Sciences 355, but is open to students who want to take the laboratory only.

2 labs; lec as part of 1 lab. G. G. Cocks.

An introduction to geometrical and optical crystallography for mineralogists, with instruction in the use of the polarizing microscope, and geometrical and optical crystallography.

692, 693, 694 Research Project Fall or spring.

3 credits; additional credit by special permission.

Prerequisite: Chemical Engineering 430. Research on an original problem in chemical engineering.

711 Advanced Chemical Engineering

Thermodynamics Spring. 3 credits. Prerequisite:

Chemical Engineering 312 or equivalent.

3 lecs. K. E. Gubbins.

Application of general thermodynamic methods to advanced problems in chemical engineering. Evaluation, estimation, and correlation of properties; chemical and phase equilibrium.

713 Applied Chemical Kinetics Fall. 3 credits.

Prerequisite: physical chemistry.

R. P. Merrill.

Fundamentals of the kinetics of reacting systems. Collision theory, unimolecular rate theory, transition state theory, and the use of simple statistical models to represent reacting chemical systems are stressed. The application of these concepts to nonideal environments, solvent effects, and reactions on solids is presented with some emphasis on catalytic phenomena.

731 Advanced Transport Phenomena Spring.

3 credits. Prerequisite: Chemical Engineering 434, 751, or equivalent.

3 lecs. C. Cohen.

Viscous laminar flow of Newtonian and Power-Law fluids. Solutions of the Navier-Stokes equations for selected steady- and unsteady-state problems. An integrated presentation of momentum, mass, and heat transfer. Models of mass and heat transfer.

751 Mathematical Methods of Chemical Engineering Analysis Fall. 3 credits.

3 lecs. W. L. Olbricht.

Application of advanced mathematical techniques to chemical engineering analysis. Linear and nonlinear ordinary differential equations, partial differential equations, vector and tensor analysis.

[772 Theory of Molecular Liquids Spring.

3 credits. Prerequisite: 711 or equivalent. Not offered 1981-82.

K. E. Gubbins.

Theory of intermolecular forces, and equilibrium statistical mechanics for nonspherical molecules. Distribution functions. Applications to thermodynamics of such fluids using integral equation and perturbation theory techniques. Mixture properties, phase diagrams for mixtures with polar or quadrupolar components. Surface properties.]

790 Seminar Fall and spring. 1 credit each term.

General chemical engineering seminar required of all graduate students majoring in the Field of Chemical Engineering.

792 Advanced Seminar in Thermodynamics Fall or 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 or spring.

Thesis research for the M.S. degree in chemical engineering.

991, 992, 993, 994, 995 Thesis Research Fall or spring.

Thesis research for the Ph.D. degree in chemical engineering.

Civil and Environmental Engineering Courses

The courses in civil and environmental engineering are listed under the following headings:

Environmental Sensing, Measurement, and Evaluation; Public and Environmental Systems Engineering; Fluid Mechanics and Hydrology; Geotechnical Engineering; Environmental Quality Engineering; Transportation; Structural Engineering; Water Resources Planning and Analysis; and Professional Practice.

A. Environmental Sensing, Measurement and Evaluation

A321 Surveying for CEE Facilities Fall, spring (on demand). 3 credits. Prerequisites: Physics 112, Math 192. Recommended: OR&IE 260 or 270.

2 lecs, 1 lab, evening tests. G. B. Lyon.

This course specifically focuses on surveying and use of results from surveying operations for planning, design, and construction of civil engineering facilities. Topics include: measurements and data reduction for determination of position, and changes therein, of terrestrial features; measurement quality control; highway curves; earthwork quantities and distribution analysis for minimum construction cost; terrestrial and photogrammetric compilation of topographic maps; use of topographic maps in planning and design; and selected topics in the acquisition of real estate and the construction of civil and environmental engineering facilities.

A656 Boundary Surveys Spring. 3 credits.

Prerequisite: permission of instructor. May not be offered 1981-82.

3 lecs.

Legal principles governing location of land boundaries. Historical development and methods of original land surveys. Retracement and restoration of property corners. Coordinate systems; mineral land surveys; riparian and littoral rights; environmental presentations; responsibilities of licensed surveyors.

A661 Photogrammetry Spring (on demand).

3 credits. Prerequisite: permission of instructor.

2 lecs, 1 lab.

Terrestrial, aerial, and space photogrammetry. Photograph geometry: tilt and relief displacements; parallax distortions; control requirements; flight planning. Zeiss Stereometric Camera. Stereo plotting,

relative and absolute orientation; Balplex, Wild Autographs, and Terragraph plotters. Geometry of remote sensors.

A671 Geodesy Spring (on demand). 3 credits. Prerequisite: permission of instructor.

3 lecs.
The figure of the earth and the precise determinations of position on or near the earth's surface. Fundamentals of geometric geodesy, physical geodesy, satellite geodesy, and map projections.

A680 Remote Sensing: Fundamentals Fall. 3 credits. Prerequisite: permission of instructor.

2 lecs, 1 lab. W. R. Philipson.
Fundamentals of sensors and sensing in the electromagnetic spectrum. Coverage includes sensors; sensor and ground-data acquisition; data geometry, analysis, and interpretation; and mission planning.

A683 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.

[A685 Physical Environment Evaluation] Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1981–82.

2 lec, 1 lab. T. Liang.
Physical environmental factors affecting engineering planning decisions: climate, soil and rock conditions, water sources. Evaluation methods: interpretation of meteorological, topographic, geologic, and soil maps, aerial photographs, and subsurface exploration records.]

A687 Image Analysis I: Landforms Fall. 3 credits. Prerequisite: permission of instructor.

2 lecs, 1 lab. T. Liang.
Analysis and interpretation of aerial photographs for a broad spectrum of soil, rock, and drainage conditions. Specific fields of application are emphasized.

A688 Image Analysis II: Physical Environments Fall. 3 credits. Prerequisite: CEE A685 or A687.

2 lecs, 1 lab. T. Liang.
Study of physical environments using aerial photographs and other remote sensing methods. Conventional photography, spectral, space, and sequential photography; thermal and radar imageries. Arctic, tropic, arid, and humid climate regions. Project applications.

A691 Project 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.

A692 Research 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.

A694 Special Topics 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.

A696 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 and industry.

A801 Thesis Fall and spring. 1–12 credits.

Students must register for credit with the professor at the start of each term.

A thesis research topic is selected by the student with the advice of the faculty member in charge, and is pursued either independently or in conjunction with others working on the same topic.

B. Public and Environmental Systems Engineering

B301 Microeconomic Analysis (also Economics 311.5) Fall. 4 credits. Prerequisite: one year of college-level mathematics. A liberal elective for engineers.

R. E. Schuler.
Intermediate microeconomic analysis similar to Economics 311 but emphasizing mathematical techniques. Theory of households, firms, monopoly and competitive markets, distribution and equilibrium welfare economics.

B302 Economic Analysis of Government (also Economics 308) Spring. 4 credits. Prerequisites: one year of college-level mathematics, plus CEE B301 or Economics 311.

R. E. Schuler.
Analysis of government intervention in a market economy. Public goods, public finance, cost-benefit analysis, environmental regulation, and macroeconomic topics.

B303 Engineering Economics and Management Spring. 3 credits. Aimed at juniors and seniors; not intended for students with substantial background in business economics or methods of operations research.

J. R. Stedinger.
Intended to give the student a working familiarity with the principles and main analytical techniques for reaching decisions about alternative engineering projects.

B305 Social Implications of Technology Fall. 3 credits. Approved liberal elective. Not open to freshmen.

W. R. Lynn.
Examines selected issues pertaining to the development, implementation, and assessment of technology. Special emphasis is given to social, political, and economic aspects of current problems that have important technological components.

B416 Seminar in Technology Assessment Spring. 3 credits. Open to graduate students and to upperclass undergraduates with permission of instructor.

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.

[B614 Legal Process] Spring. 3 credits. Limited to graduate students and to upperclass undergraduates with permission of instructor. Not offered 1981–82.

N. Orloff.
An introduction to the structure and operation of our legal system. Development of legal skills and the ability to do one's own basic legal research.]

B615 Environmental Law I Fall. 4 credits. Limited to graduate students and to seniors and other undergraduates with permission of instructor.

N. Orloff.
An introduction to how the legal system handles environmental problems. Study of federal statutes, such as the National Environmental Policy Act, the

Clean Air Act, and the Clean Water Act; the regulations issued to implement them; and the important judicial decisions that have been handed down under each.

B616 Environmental Law II Spring. 3 credits. Prerequisite: CEE B615 or equivalent.

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.

B617 Public Systems Analysis Spring. 3 credits. Prerequisite: CEE B303 or any introductory systems analysis course.

C. A. Shoemaker.
An introduction to the philosophy and applications of systems analysis to public sector problems in water resources, transportation, natural resources, public health, global planning, and energy–environmental quality issues.

B693 Environmental and Water Resources Systems Analysis Colloquium Fall or spring. 1 credit.

Staff.
Lectures in various topics related to environmental or water resources systems planning and analysis.

B791 Environmental and Water Resources Systems Analysis Design Project On demand. Credit variable. Prerequisite: permission of instructor. May extend over two semesters.

Staff.
Design or feasibility study of environmental or water resources systems, supervised and assisted by one or more faculty advisers; individual or group participation. Final report required.

B792 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.

B794 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.

C. Fluid Mechanics and Hydrology

C301 Fluid Mechanics Fall. 4 credits. Prerequisite: T&AM 203 (may be taken concurrently).

3 lecs, 1 rec. Evening exams. W. H. Brutsaert.
Hydrostatics, the basic equations of fluid flow, potential flow and dynamic pressure forces, viscous flow and shear forces, steady pipe flow, turbulence, dimensional analysis, selection of turbomachinery.

C302 Hydraulic Engineering Spring. 3 credits. Prerequisite: CEE C301.

2 rec, 1 lab, field trips. G. H. Jirka.
Steady open channel flow, river modeling, unsteady pipe flow, theory of turbomachinery. Laboratory includes number of experiments in hydraulic and river engineering.

[C609 Descriptive Hydrology] Spring. 2 credits. Intended for nonengineering majors. Prerequisite: permission of instructor. Not offered 1981–82.

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, ground water, surface runoff, floods, and droughts.]

C615 Advanced Fluid Mechanics Fall. 3 credits.

Prerequisite: CEE C301.

3 lects. P. L.-F. Liu.

Introduction to tensor analysis, conservation of mass, momentum, and energy from a rigorous point of view. 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.

[C618 Dynamic Oceanography Fall. 3 credits.

Prerequisite: CEE C301. Not offered 1981–82.

P. L.-F. Liu.

The statics and dynamics of oceans and lakes. Currents in homogeneous and stratified bodies of water. Tidal motions. Waves in a stratified ocean.]

[C620 Analytical Hydrology Fall. 3 credits.

Prerequisite: CEE C301. Not offered 1981–82.

W. H. Brutsaert.

Physical and statistical analysis related to hydrologic processes. Hydrometeorology and evaporation. Infiltration and base flow. Surface runoff and channel routing. Linear and nonlinear hydrologic systems analysis. Storage routing and unit hydrograph theory.]

C621 Flow in Porous Media and Ground Water

Spring. 3 credits. Prerequisite: CEE C301.

W. H. Brutsaert.

Fluid mechanics and equations of single-phase and multiphase flow; methods of solution. Aquifer hydraulics, pumping wells; drought flows; infiltration, ground water recharge; land subsidence; sea-water intrusion, miscible displacement; transient seepage in unsaturated materials.

[C622 Engineering Micrometeorology Spring.

3 credits. Prerequisite: CEE C301. Not offered 1981–82.

3 lects. 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; urban climatology; interaction of wind and structures; snow, and ice problems.]

C631 Coastal Engineering I Spring. 3 credits.

Prerequisite: CEE C301.

3 lects. 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.

C633 Coastal Engineering II Fall. 3 credits.

Prerequisite: CEE C631.

3 lects. 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.

C641 Environmental Fluid Mechanics I Fall.

3 credits. Prerequisite: CEE C301.

3 lects. 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.

[C642 Environmental Fluid Mechanics II Spring.

3 credits. Prerequisite: CEE C641 or permission of instructor. Offered alternate years. Not offered 1981–82.

3 lects. 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.]

[C643 Unsteady Hydraulics Spring. 3 credits.

Prerequisite: CEE C302 or permission of instructor. Not offered 1981–82.

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.]

[C651 Environmental Planning and Operation of Energy Facilities Spring. 3 credits. Mixed lecture

and seminar format. Prerequisites: CEE C641 or equivalent. Offered alternate years. Not offered 1981–82.

G. H. Jirka.

Survey of analytical methodologies for predicting and controlling the environmental impacts of individual energy facilities or of energy systems. 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 releases techniques. Models for regional energy facility siting.]

C691 Project 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.

C693 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.

C694 Special Topics in Hydraulics On demand.

Credit variable.

Staff.

Special topics in fluid mechanics, hydraulic engineering, or hydrology.

C744 Experimental and Numerical Methods in Hydraulics and Hydrology On demand. 2 credits.

Offered in 1981–82 with emphasis on experimental methods.

G. H. Jirka.

Methods used in planning and conducting laboratory and field experiments and in performing numerical analysis. Specific subject matter varies according to the interests of students and staff.

C792 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.

D. Geotechnical Engineering**D301 Introductory Soil Mechanics** Spring.

3 credits.

2 lects, 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 stability, earth pressure, and other design problems. Introduction to laboratory testing.

D606 Foundation Engineering Fall. 3 credits.

Prerequisite: CEE D301.

3 lects, 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.

D607 Retaining Structures and Slopes Spring.

3 credits. Prerequisite: CEE D301.

3 lects, optional tutorial. T. D. O'Rourke,

F. H. Kulhawy.

Earth pressure theories. Design of rigid, flexible, braced, tied back, slurry, and reinforced earth walls. Stability of excavation, cut, and natural slopes.

D631 Highway Engineering (also Agricultural Engineering 491) Fall. 3 credits. Prerequisite: CEE

D301 or permission of instructor.

2 lects, 1 lab. L. H. Irwin.

See Agricultural Engineering 491 for course description.

D632 Bituminous Materials and Pavement Design (also Agricultural Engineering 492) Spring.

3 credits. Prerequisite: CEE D631 or permission of instructor.

2 lects, 1 lab. L. H. Irwin.

See Agricultural Engineering 492 for course description.

D691 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 this subject area.

D693 Seminar in Geotechnical Engineering Fall or spring.

Staff.

Presentation and discussion of topics of current research and practice in geotechnical engineering.

D694 Special Topics in Geotechnical Engineering On demand. 1–6 credits.

Staff.

Supervised study of special topics not covered in the formal courses.

D710 Engineering Behavior of Soils Fall.

3 credits. Prerequisite: CEE D301.

3 lects. Staff.

Detailed study of physiochemical nature of soil. Stress states and stress-strain-time behavior. In-depth evaluation of the strength, compressibility, and permeability of natural soils. Study of special deposits such as sensitive, organic, frozen, and man-made soils.

D711 Rock Engineering Fall. 3 credits.

Prerequisite: CEE D301 or permission of instructor. Recommended: introductory geology.

2 lects, 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.

D712 Graduate Soil Mechanics Laboratory Fall. 3 credits. Prerequisite: CEE D710.

T. D. O'Rourke.

Laboratory measurement of soil properties, from introductory to advanced techniques. Emphasis on strength, compressibility, and permeability tests. Critical evaluation of laboratory methodology.

[D714 Advanced Foundation Engineering]

Spring. 3 credits. Prerequisite: CEE D606. Not offered 1981-82.

3 lecs. Staff.

A continuation of CEE D606 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.]

D715 Soil Dynamics Spring. 3 credits.

Prerequisite: permission of instructor.

3 lecs. Staff.

Principles of vibration under harmonic and transient loading. Wave propagation. Dynamic response of soils and its measurement. Analytical models for harmonic, transient, and earthquake loading. Design examples of foundations and embankments.

D717 Embankment Dam Engineering Spring.

2 credits. Prerequisites: CEE D607 and D711, 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.

[D718 Case Studies in Geotechnical Engineering]

Spring. 3 credits. Prerequisites: CEE D606 and D607. Not offered 1981-82.

Staff.

Study of case histories in geotechnical engineering. Critical evaluation of successful and unsuccessful projects. Oral presentations and engineering report evaluation of each case.]

D719 Tunnel Engineering Spring. 2 credits.

Prerequisites: CEE D607 and D711.

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.

D792 Research in Geotechnical Engineering

On demand. 1-6 credits.

Staff.

For the student who wants to pursue a particular geotechnical topic in considerable depth.

E. Environmental Quality Engineering**E301 Environmental Quality Engineering** Spring.

3 credits. Prerequisite: CEE C301.

J. J. Bisogni, J. M. Gossett.

Introduction to the engineering aspects of environmental quality control. Emphasis on water quality control concepts, theory, and methods. Elementary analysis and design applicable to water supply and distribution and to wastewater and storm-water collection systems. Introduction to processes underlying water and wastewater treatment. Effects of wastewater on natural waters.

E604 Assimilation of Pollutants in Natural Waters

Fall. 3 credits. Prerequisite: CEE E301 or permission of instructor.

3 lecs.

Assimilation and transport of pollutants in the aquatic environment. Emphasis on the physics, chemistry, and biology that form the basis for mathematical description of the assimilation phenomenon in natural waters.

E610 Chemistry of Water and Wastewater Fall.

3 credits. Prerequisite: one year of college chemistry or permission of instructor.

3 lec-recs. J. M. Gossett.

Principles of physical, organic, inorganic, and biological chemistry applicable to the understanding, design, and control of water and wastewater treatment processes and to reactions in receiving waters.

E611 Aquatic Chemistry Spring. 3 credits.

Prerequisite: CEE E610 or Chemistry 287-288.

3 lecs. J. J. Bisogni.

Chemical equilibria in natural aquatic systems, including water and wastewater treatment systems. Chemical thermodynamics, acid-base systems, oxidation-reduction systems, coordination chemistry, solid-liquid-gas interfaces with regard to precipitation, dissolution, and adsorption. Chemical-biological interfaces in natural systems. Emphasis on phenomena, mathematical solution of chemical equilibria, and application to engineering management of water quality.

E631 Industrial Waste Management Spring.

3 credits. Prerequisites: CEE E301 and E610 or permission of instructor.

3 lec-discs. R. C. Loehr.

An analysis of the treatment and disposal of industrial wastes, primarily wastewaters. Regulatory and legal aspects; pretreatment; treatment and disposal processes for conventional, nonconventional, and toxic pollutants; industrial waste survey; case studies of specific industries; opportunities for recycling and reuse. Emphasis is on an understanding of the constraints on industrial waste discharges and the processes and approaches to meet those constraints.

E633 Environmental Quality Management Fall;

spring on demand. 3 credits (4 with approval of instructor). For upperclass or graduate students. May not be offered 1981-82.

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.

E638 Sludge Treatment, Utilization, and Disposal

Spring. 3 credits. Prerequisites: CEE E301 and E610 or permission of instructor.

R. I. Dick.

An analysis of the quantity and quality of residues produced from wastewater treatment facilities as a function of process design and operation; 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.

E693 Environmental Quality Engineering Seminar

Fall or spring. 1 credit. Open to undergraduates who have received permission of the instructor. Presentation and discussion of current topics and problems in sanitary engineering and environmental quality engineering.

E712 Water Chemistry Laboratory Fall. 1 credit.

Enrollment limited. Prerequisites: CEE E610 (students may enroll concurrently in CEE E610) and permission of instructor.

J. M. Gossett.

Laboratory methods for analysis of pollutants in water and wastewater.

E715 Chemical and Physical Phenomena and Processes

Fall. 4 credits. Prerequisite: CEE E610 or permission of instructor.

3 lecs, 1 lab. J. J. Bisogni.

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. Residuals control and treatment. Pertinent laboratory studies.

E716 Biological Phenomena and Processes

Spring. 4 credits. Prerequisite: CEE E715 or permission of instructor.

3 lecs, 1 lab. J. M. Gossett.

Theoretical and engineering aspects of biological phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes, and to their transformation in receiving waters. Biokinetic analysis and design of biological treatment process. Pertinent laboratory studies.

E791 Design Project in Sanitary Engineering On

demand. Variable credit. Prerequisite: CEE E301 or equivalent.

Staff.

The student chooses or is assigned a problem in the design of water or wastewater treatment processes or plants or wastewater disposal systems; or a laboratory project.

E792 Sanitary 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.

E794 Special Topics in Sanitary Engineering On

demand. Variable credit.

Hours to be arranged. Staff.

Supervised study in special topics not covered in formal courses.

E801 Thesis Fall and spring. 1-12 credits.

Students must register for credit with the professor at the start of each term.

A thesis research topic is selected by the student with the advice of the faculty member in charge, and is pursued either independently or in conjunction with others working on the same topic.

F. Transportation**F301 Introduction to Transportation Engineering**

Fall. 3 credits.

M. A. Turnquist.

Introduction to technological, economic, and social aspects of transportation. Emphasis on the form and functioning of transportation systems and their components. Vehicle and system technology, traffic flow and control, terminal operations, supply-demand interactions, system planning and management, and institutional issues.

F621 Urban Transportation Planning Fall.

4 credits.

G. P. Fisher.

The urban transportation problems: its roots, manifestations, and implications; the systems analysis approach to transportation; the demand and supply side of transportation; the urban transportation planning process and its modeling components; generation and evaluation of alternatives. A laboratory period is designed for study-team research.

F623 Travel Demand Theory and Applications

Spring. 3 credits. Prerequisite: CEE F621 or permission of instructor.

A. H. Meyburg.

This course concentrates on new methods for estimating and predicting travel demand. In particular, it considers techniques based on a treatment of the individual as an economic or

psychological decision-making unit. Theoretical background of the models, empirical estimation, measurement of attributes and practical applications are considered. Practical problems and directions of present and future research are outlined. Survey sampling is introduced.

F624 Transportation Systems Analysis Fall. 3 credits. Prerequisites: CEE F301, OR&IE 320 or equivalent.

M. A. Turnquist.
Application of operations research and systems analysis techniques to transportation systems, both passenger and freight. Network flows, routing and scheduling, technology selection, and terminal operation.

F625 Transportation Systems Design Spring. 3 credits. Prerequisite: CEE F624.

M. A. Turnquist.
Techniques for design of transportation systems, including networks of fixed facilities and route networks. Time-staging of improvements, use of low-capital cost options, and the role of demonstration projects. Evaluation of alternative designs.

F643 Operations, Design, and Planning of Public Transportation Systems Spring. 3 credits.

G. P. Fisher.
A study of mass transportation of the past and present, innovative forms of mass and individual transportation in urban areas. The financing and organization of mass transportation; the "free transit" versus fares dilemma. Planning for mass transportation: special applications, implementation of plans, planning transportation in new towns.

F645 Freight Transportation Spring. 3 credits.

G. P. Fisher.
Transportation planning methodology for interurban and intraurban freight movements. Relationship to the urban transportation planning process. Problem identification, solution strategies, analysis techniques. Freight demand analysis. Alternative technologies in view of energy, efficiency, and environmental impacts.

F646 Transportation Economics Spring. 3 credits. Prerequisite: CEE B301 or equivalent.

A. H. Meyburg.
Economic analysis of freight and passenger transportation systems. Pricing and regulation. Elements of cost-benefit analysis and evaluation of public investment and subsidization. Consideration of national transportation policy.

F791 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.

F792 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.

F793 Transportation Colloquium Fall or spring. 1 credit.
Lectures in various topics related to transportation planning and analysis.

F794 Special Topics in Transportation Fall or 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.

Related Course

D631 Highway Engineering (also Agricultural Engineering 491)

For course description, see Agricultural Engineering 491.

G. Structural Engineering

G301 Structural Engineering I Fall. 4 credits.
Prerequisite: T&AM 202.

3 lecs, one 2-hour lab; evening exams. P. Gergely.
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.

G302 Structural Engineering II Spring. 4 credits.
Prerequisite: CEE G301.

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.

G303 Structural Engineering III Fall. 4 credits.

Prerequisites: CEE G302 or permission of instructor; CEE G351 is also required, but may be taken concurrently.

Evening exams. T. Peköz.
Continues the study of the behavior and design of steel and concrete members and structures. Structural elements, connections, and systems. Plastic analysis of steel frames.

G304 Structural Engineering IV Spring. 4 credits.
Prerequisite: CEE G303.

M. D. Grigoriu.
Intended to develop an understanding of the structural design process. Comprehensive design project. Lectures on preliminary design, composite construction, prestressed concrete, and various structural systems such as bridges, roofs, tall buildings. Seismic design.

G305 Structural Behavior Laboratory Spring. 2 credits. Prerequisite (may be taken concurrently instead): CEE G302. May not be offered 1981-82.

R. N. White.
A lab course on behavior of structures, utilizing small-scale models. Elastic, inelastic, and nonlinear behavior of structural components and systems. Projects.

G351 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.

G608 Timber Engineering Spring. 1 credit.
Prerequisite: CEE G303. May not be offered 1981-82.

R. N. White.
Structural properties of timber. Timber tension members, beams, and beam-columns. Glued-laminated timber design. Connection behavior and design. Special timber structural systems.

G610 Fundamentals of Structural Mechanics

Fall. 3 credits. Prerequisite (may be taken concurrently instead): CEE G303.

Staff.
Theory of elasticity, energy principles, plate flexure, failure theories, inelastic stress-strain relationships, stress concentration, introduction to fracture, fatigue.

G612 Advanced Structural Analysis Fall.

3 credits. Prerequisites: CEE G302 and computer programming.

A. R. Ingraffea.
Direct stiffness and flexibility methods in matrix formulation, use of standard analysis programs, error detection, substructuring, and special analysis procedures.

G614 Structural Model Analysis and Experimental Methods Fall. 3 credits.

2 lecs, 1 lab. R. N. White.
Dimensional analysis and similitude. Model materials, fabrication, loading, and instrumentation techniques. Experimental stress analysis.

G652 Advanced Plain Concrete Spring. 3 credits.
Prerequisite: CEE G351 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, physical properties, chemical properties, and mechanical properties.

G653 Structure and Properties of Materials

Spring. 3 credits. Limited to graduate students in engineering or physical sciences, or undergraduates by permission of instructor. Offered alternate years. Will be offered 1981-82.

2 lecs, conferences. F. O. Slate.
Internal structure from amorphous to crystalline state. Forces holding matter together versus forces causing deformation and failure. Correlation of internal structures with physical and mechanical properties. Applications to various engineering materials.

[G654 Low-Cost Housing Primarily for Developing Nations Spring. 3 credits. Offered alternate years. Not offered 1981-82.

2 lecs, conferences. F. O. Slate.
A multidisciplinary course. Students work intensively, usually in their own discipline, on a term project, while also being introduced to problems and approaches of other disciplines. Engineers investigate the technological aspects of the subject and other aspects that influence technological decisions, such as cultural and economic factors.]

G655 Low-Cost Housing for Developing Nations — Workshop for Physical Planning, Site Selection, and Design Spring. A mixed class of advanced civil engineering and architecture students. Offered alternate years. Will be offered 1981-82.

F. O. Slate.
Discussions and workshops on physical planning, site selection, choice of materials, and detailed design of individual structures and groupings.

G693 Structural Engineering Seminar Fall or spring. 1 credit. Limited to qualified seniors and graduate students.

Staff.
Presentation of topics of current interest in the field of structures.

[G709 Engineering Fracture Mechanics Spring. 3 credits. Prerequisite: CEE G713 or permission of instructor. Offered alternate years. Not offered 1981-82.

2 lecs, 1 lab. A. R. Ingraffea.
Fundamentals of fracture mechanics theory. Energy and stress-intensity approaches to fracture. Mixed-mode fracture. Fatigue crack propagation. Finite and boundary element methods in fracture mechanics. Introduction to elastic-plastic fracture mechanics. Laboratory techniques for fracture toughness testing of metals, concrete, and rock.]

G711 Structural Stability: Theory and Design

Spring. 3 credits.

T. Peköz.
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.

G713 Finite Element Analysis Spring. 3 credits. Prerequisites: CEE G610 and G612, or permission of instructor.

Staff.
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.

G715 Structural Reliability and Safety Fall. 3 credits. Prerequisite: CEE G303. Offered alternate years.

M. D. Grigoriu.
Probabilistic models for loads, load combinations, and strength of members and structural systems. Structural reliability. Design code provisions for safety.

G716 Prestressed Concrete Structures Fall. 3 credits. Prerequisite: CEE G303. Recommended: CEE G304.

3 lects. 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.

G717 Advanced Reinforced Concrete Spring. 3 credits. Prerequisite: CEE G303. Recommended: CEE G304.

3 lects. 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.

G718 Advanced Design of Metal Structures Fall. 3 credits. Prerequisite: CEE G303.

W. McGuire.
Behavior and design, with emphasis on connections, plate girders, and cold-formed steel structures. Torsion of steel members. Fatigue and fracture.

G719 Advanced Behavior of Metal Structures Spring. 3 credits. Prerequisite: CEE G303.

W. McGuire.
Behavior of beams, beam-columns, and single and multistory frames. Analysis and design of tall building systems. Cable-supported structures.

[G720 Shell Theory and Design] Spring. 3 credits. Offered alternate years. Not offered 1981–82.

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.]

G722 Structural Design for Dynamic Loads Spring. 3 credits.

P. Gergely.
Analysis, design, and behavior of structures subjected to dynamic effects, with emphasis on earthquake-resistant design.

[G732 Optimum Structural Design] Fall. 3 credits. Offered alternate years. Not offered 1981–82.

Design of minimum weight or cost structures. Includes full-stressed design, classical, minimization procedures, and mathematical programming methods.]

[G733 Numerical Methods in Structural Engineering] Fall. 3 credits. Prerequisites: CEE G610 and G612. Offered alternate years. Not offered 1981–82.

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.]

G734 Advanced Topics in Finite Element Analysis Fall. 3 credits. Prerequisite: G713. Offered alternate years.

J. F. Abel.
Lectures and colloquia on selected advanced topics and research in progress, including dynamics, nonlinear analysis, shells, fracture mechanics, fluid dynamics, and computer graphics.

G757 Civil and Environmental Engineering Materials Project On demand. 1–3 credits.

F. O. Slate.
Individual projects or reading and study assignments involving engineering materials.

G791 Design Project in Structural Engineering Fall or 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.

G792 Research in Structural Engineering On demand. Variable credit.

Hours to be arranged. Staff.
Pursuit of a branch of structural engineering further than can be done in regular courses. Theoretical or experimental investigation of suitable problems.

G794 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.

G801 Thesis Fall and spring. 1–12 credits.

Students must register for credit with the professor at the start of each term.
A thesis research topic is selected by the student with the advice of the faculty member in charge, and is pursued either independently or in conjunction with others working on the same topic.

H. Water Resources Planning and Analysis

H615 Water Resources Problems and Policies

Fall. 3 credits. Intended primarily for graduate engineering and nonengineering students but open to qualified upperclass students. Prerequisite: permission of instructor.

Lec-disc. L. B. Dworsky.
Historical and contemporary perspectives of water problems, organization, and public policies.

H624 Stochastic Hydrologic Modeling Spring. 2–3 credits. Prerequisite: OR&IE 270.

J. R. Stedinger.
Develops statistical techniques in time and frequency domain used to analyze and model stochastic processes. Lectures examine Box-Jenkins, fractional-Brownian noise and other steamflow models, drought and flood frequency estimation, parameter estimation in dynamic systems, and analysis of simulation output.

[H626 Water Quality Modeling] Spring. 3 credits. Prerequisites: CEE B303 or Agricultural Engineering 475; CEE C651 or CEE E604 recommended. Not offered 1981–82.

D. P. Loucks.

Predictive models of the behavior of biological and chemical substances in bodies of water and in surface runoff. Regional management of water quality.]

H628 Water Resources Systems Planning I Fall. 3 credits. Prerequisite: CEE B303 or equivalent.

D. P. Loucks.
Application of deterministic optimization and simulation techniques in water resources planning. River-basin modeling, including irrigation planning and operation, hydropower capacity development, flow augmentation, and flood control and protection.

H629 Water Resource Systems Planning II

Spring. 3 credits. Prerequisites: CEE H628 or permission of instructor.

D. P. Loucks, J. R. Stedinger.
Optimization and simulation methods for water resource planning under uncertainty. Basics of stochastic hydrologic modeling, stochastic river-basin and reservoir models, and water quality modeling.

K. Professional Practice

K301 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.

K370 Uncertainty Analysis in Engineering Fall. 4 credits. Prerequisite: first-year calculus.

J. R. Stedinger.
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.

K510 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 K511).

K511 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 K510.

School faculty and visiting engineers.
A continuation of CEE K510.

K521 Professional Practice in Engineering

Spring. 3 credits. Required for and limited to students in the M.Eng.(Civil) program.

W. R. Lynn.
Introduction to nontechnical aspects of engineering practice: legal, financial, social, and ethical aspects; personnel management; communications; professional organizations.

K601 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.

Computer Science Courses

The Department of Computer Science is organized as an intercollege department in the College of Arts and Sciences and the College of Engineering.

100 Introduction to Computer Programming Fall or spring. 4 credits. S-U grades optional. Students who plan to take both Computer Science 101 and 100 must take 101 first.

2 lecs, 1 rec (optional), 3 evening exams, final. 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 PL/I; FORTRAN is introduced and used for final problems. The course does not presume previous programming experience. An introduction to numerical computing is included, although no college-level mathematics is presumed. Programming assignments are tested and run on interactive, stand-alone microcomputers.

101 The Computer Age Spring. 3 credits. S-U grades optional. Credit cannot be granted for both Computer Science 100 and 101 unless 101 is taken first.

2 lecs, 1 rec. Introduction to computer science and programming for students in nontechnical areas. Topics include the history of computation; microtechnology; the retrieval and transmission of information; scientific computing; computer graphics, art, and music; robotics, natural language processing, and machine intelligence. Students become acquainted with the notion of an algorithm by writing several PL/C programs using the Cornell Program Synthesizer. The amount of programming is about half of that taught in Computer Science 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 FORTRAN Programming Fall or spring, weeks 1–5 only. 1 credit. S-U grades optional. Credit will not be granted for both Computer Science 100 and 102 unless 102 is taken first. Elementary programming concepts. Laboratory problems using FORTRAN IV language.

103 Introduction to PASCAL Fall or spring, weeks 2–5 only. 1 credit. Prerequisite: Computer Science 100 or equivalent programming experience. S-U grades optional.

Variables; data types and type definitions; scalar, set, array, and record types; language constructs for systematic programming; files; procedures and functions. Several programming assignments.

104 Introduction to APL Programming Fall or spring, weeks 6–9 only. 1 credit. Prerequisite: Computer Science 100 or equivalent programming experience. S-U grades optional. Introduction to interactive terminal computing using the APL language.

107 Introduction to Interactive Computing with CMS Fall or spring, weeks 2–5 only. 1 credit. Prerequisite: Computer Science 100 or equivalent programming experience. S-U grades only. Concepts of interactive computing, using the editor, data management, utility commands, remote job submission, interactive language processors, and the EXEC facility.

108 Introduction to Statistical Packages Fall or spring, weeks 10–13 only. 1 credit. S-U grades only. Discussion of the wide range of procedures and data transformation facilities provided by statistical program packages. Topics covered include data preparation and formatting, program control cards, JCL, and hints for debugging.

109 Multistep Job Processing and JCL Fall or spring, weeks 6–9 only. 1 credit. Prerequisite: Computer Science 100 or equivalent programming experience. S-U grades only. Outline of HASP and OS systems currently implemented. Topics include job control language for using tapes, disks; catalogued procedures and symbolic parameters, and HASP commands for special processing.

211 Computers and Programming (also Engr 211) Fall or spring. 3 credits. Prerequisite: Computer Science 100 or equivalent programming experience.

2 lecs, 1 rec. Intermediate programming in a high-level language and introduction to computer science. Topics include program development, invariant relations, block structure, recursion, parallel processing, data structures, analysis of algorithms, and a brief introduction to machine architecture and machine-level programming. PL/I is the principal programming language used.

280 Discrete Structures Fall. 4 credits. Prerequisite: Computer Science 211 or permission of instructor.

3 lecs. Mathematical aspects of programming and computing. Induction, logical proof, and discrete structures used in programs. Introducing recursive functions, relations, homomorphisms, partially ordered sets, the predicate calculus, and concepts from automata and computability theory.

[305 Social Issues in Computing] Fall. 3 credits. Prerequisite: Computer Science 100 or 101 or permission of instructor. Not offered 1981–82.

2 lec-sem. The economic, political, legal, and cultural impact of computers and computer-related technology. The role of computers in coordinating diversity and reducing disorder. Effect of computers on the individual. Data banks and privacy. Machine creativity and machine intelligence.]

314 Introduction to Computer Systems and Organization Fall or spring. 4 credits. Prerequisite: Computer Science 211 or equivalent.

2 lecs, 1 lab. Logical structure of digital computers: representation of information, addressing mechanisms, storage and peripheral hardware, the input-output channel.

321 Numerical Methods (also Engr 321) Fall or spring. 4 credits. Prerequisites: Mathematics 221 or 293, and knowledge of FORTRAN equivalent to what is taught in Computer Science 100.

3 lecs. Students solve representative problems by programming appropriate algorithms and using library programs. Numerical methods for systems of linear equations, interpolation, integration, ordinary differential equations, nonlinear equations, optimization, and linear least squares.

410 Data Structures Fall. 4 credits. Prerequisite or corequisite: Computer Science 314.

2 lecs. Lists, trees, graphs, arrays, and other forms of data structure and their implementation. Relation between language and data structure (e.g., introduction to LISP). Dynamic storage allocation and memory management. Searching and sorting methods.

414 Systems Programming and Operating Systems Spring. 4 credits. Prerequisite: Computer Science 314 or permission of instructor.

3 lecs. The logical design of systems programs with emphasis on multiprogrammed operating systems. Input-output methods, process synchronization, memory management, sharing, file systems. Case studies. Project to implement a small system.

418 Interactive Computer Graphics (also Architecture 334) Spring. 4 credits. Enrollment limited for 1981–82. Prerequisite: Computer Science 314.

2 lecs, 1 lab. Introduction to the software and hardware concepts of interactive computer graphics. Topics include input methods, graphic data structures, geometric modeling, surface description methods, hidden-line–hidden-surface algorithms, image processing, color perception, and realistic image synthesis. Examples of computer-aided design applications are presented. Assignments consist of hands-on experience on storage tube, vector refresh, and color raster displays.

432 Introduction to Data-Base Systems Spring. 4 credits. Prerequisite: Computer Science 211.

2 lecs, 1 rec. Introduction to modern data-base systems: basic models of file organization and access strategies, and problems of file maintenance and information retrieval. Involves substantial programming exercises.

481–482 Introduction to Theory of Computing I and II 481, fall; 482, spring. 4 credits each term. Prerequisites: Computer Science 211 and 280 or equivalent mathematics, or permission of instructor.

3 lecs. Introduction to modern theory of computing. Covers automata theory, formal languages, effective computability, computational complexity, analysis of algorithms.

490 Independent Reading and Research Fall or 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.

Introduction to practical, modern ideas in programming methodology. Covers style and organization of programs, basic techniques for presenting proofs of correctness of programs, the use of a "calculus" for the derivation of programs.

611 Advanced Programming Languages Fall. 4 credits. Prerequisite: Computer Science 410 or equivalent.

3 lecs. Formal specification of programming languages, including LISP, ALGOL 60, and PL/I. Principles of structure and design and recent developments in programming languages, including ALGOL 68. Introduction to program semantics and its application in classifying and comparing programming languages.

612 Translator Writing Spring. 4 credits. Prerequisite: Computer Science 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, translator writing systems.

613 Concurrent Programming and Operating Systems Principles Fall. 4 credits. Prerequisites: Computer Science 600 and 414 or permission of instructor. 3 lecs.

Advanced techniques and models of concurrent systems. Synchronization of concurrent processes. Parallel programming languages. Deadlock. Verification.

[615 Machine Organization] Spring. 4 credits. Prerequisite: Computer Science 314 or permission of instructor. 3 lecs. Not offered 1981–82.]

[618 Picture Processing] Spring. 4 credits. Prerequisite: Computer Science 611 or permission of instructor. 3 lecs. Not offered 1981–82.]

621–622 Numerical Analysis 621, fall; 622, spring. 4 credits each term. Prerequisites: a course in mathematics beyond freshman-sophomore calculus, such as Mathematics 411, 421, or 431; working knowledge of FORTRAN. 3 lecs.

The analysis and implementation of algorithms for the numerical solution of basic mathematical problems. Emphasis is placed on the estimation of error, the analysis of stability, and how to design efficient and reliable numerical algorithms. During both terms the student solves representation problems by writing original programs and by making use of high quality, state-of-the-art software. Fall term: direct methods for linear equations, interpolation, least squares and polynomial approximation, nonlinear equations, and optimization. Spring term: quadrature, ordinary and partial differential equations, methods for sparse systems of linear equations, eigenvalue problems.

623 Short Course on Linear and Nonlinear Least Squares 2 credits. Fall, weeks 1–6 only. Prerequisite: knowledge of Computer Science 321 or permission of instructor. Topics include: orthogonal matrix methods for the least squares (LS) problem, using LINPACK to solve the LS problem, the Lawson-Hanson codes, variable projection methods for fitting sums of exponentials, and software for general nonlinear least squares problems.

624 Short Course on Spline Approximation 2 credits. Fall, weeks 7–12 only. Prerequisite: knowledge of Computer Science 321 or permission of instructor. Practical introduction to curve and surface fitting with splines. Topics include: interpolation with cubic splines, parabolic spline interpolation, B-splines, smoothing, and splines under tension. The deBoor spline package is extensively used.

632 Data-Base Systems Fall. 4 credits. Prerequisites: Computer Science 410, and either 432 or permission of instructor. 2 lecs. Review of hierarchical network and relational data-base models. Principal data-base systems and query languages. Hardware for data-base processing. Implementation and optimization questions. Data integrity and protection for distributed systems. Relational data-base theory.

635 Information Organization and Retrieval Spring. 4 credits. Prerequisite: Computer Science 410 or equivalent. 2 lecs. Introduction to information retrieval. File organization and search algorithms. Statistical analysis and automatic classification of information. Structural language analysis. Dictionary techniques. Interactive retrieval. Questioning and answering and data-base retrieval. Evaluation of retrieval effectiveness.

681 Theory of Algorithms and Computing I Fall. 4 credits. Prerequisite: Computer Science 481 or permission of instructor. 3 lecs.

Computational models, measures of complexity, analysis of algorithms, arithmetic complexity, lower bounds, reducibilities, polynomial complete problems.

682 Theory of Algorithms and Computing II Spring. 4 credits. Prerequisite: Computer Science 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 or spring. 1 credit. For graduate students interested in computer science.

1 sem. Staff, visitors, and students. A weekly meeting for the discussion and study of important topics in the field.

711 Theory of Programming Languages Spring. 4 credits. Prerequisites: Computer Science 611 and 481. Not offered every year. 2 lecs.

Advanced topics in formal semantics. Topics may include mathematical semantics, program verification systems, application of formal semantics to language design, variable-free languages, correctness of implementations.

712 Theoretical Aspects of Compiler Construction Spring. 4 credits. Prerequisites: Computer Science 612 and 481. Not offered every year. 2 lecs.

Formal methods of syntactic analysis, including precedence, bounded context, and LR techniques. General parsing methods and their time-spaced complexity. Noncanonical parsing techniques. Formal methods of object code optimization.

713 Seminar in Operating Systems Fall or spring. 4 credits. Prerequisite: Computer Science 613 or permission of instructor. 1 sem.

Discussion of contemporary issues in operating systems.

719 Seminar in Programming Fall or spring. 4 credits. Prerequisite: Computer Science 611 or permission of instructor. 1 sem.

721 Advanced Numerical Analysis Fall. 4 credits. Prerequisite: Computer Science 621 or 622 or permission of instructor. Alternates with Computer Science 722. Topics are chosen at instructor's discretion. Sample topics include matrix computations, numerical optimization, numerical solution of ordinary differential equations and partial differential equations.

722 Advanced Numerical Analysis Spring. 4 credits. Alternates with Computer Science 721. See 721 description, above.

729 Seminar in Numerical Analysis Fall or spring. 4 credits. Prerequisite: permission of instructor.

[733 Selected Topics in Information Processing (also OR&IE 789)] Not offered 1981–82.]

734 Seminar in File Processing Fall. Credit and hours to be arranged. Prerequisite: Computer Science 733.

739 Seminar in Information Organization and Retrieval Fall or spring. 4 credits. Prerequisite: Computer Science 635.

781 Advanced Theory of Computing Fall. 4 credits. Prerequisites: Computer Science 681 and 682, or permission of instructor. Alternates with Computer Science 782. Not offered every year. At instructor's discretion, advanced topics, possibly including automata, computability, computational complexity, program schemata, semantics, and analysis of algorithms.

782 Advanced Theory of Computing Spring. 4 credits. Alternates with Computer Science 781. Not offered every year.

789 Seminar in Automata Theory Fall or spring. 4 credits. Prerequisite: permission of instructor. 1 sem.

790 Special Investigations in Computer Science Fall or spring. Prerequisite: permission of a computer science adviser. Independent research.

890 Special Investigations in Computer Science Fall or spring. Prerequisite: permission of a computer science adviser. Master's degree research.

990 Special Investigations in Computer Science Fall or spring. Prerequisite: permission of a computer science adviser. Doctoral research.

Electrical Engineering Courses

210 Introduction to Electrical Systems (also Engr 210) Fall or spring. 3 credits. Prerequisites: Mathematics 192 and Physics 112. 3 lec-recs.

Circuit elements and laws; natural response of linear systems; impedance and pole-zero concepts; complex frequency and phasors; forced response and power systems; transfer function and frequency response; low-frequency terminal characteristics of diodes, triodes, and transistors; linear models of electronic devices; bias circuits and frequency response of amplifiers; operational amplifiers, feedback, and oscillators.

230 Introduction to Digital Systems Fall or spring. 3 credits.

2 lecs, 5 lab experiments. Introduction to basic analysis and design techniques and methodology of digital and computer systems. Boolean algebra; integrated circuit components used in digital-system implementation; codes and number systems; logic design of combinational circuits; logic design of sequential circuits; microprocessors and microcomputers; application of microprocessors and microcomputers to digital system design.

301 Electrical Signals and Systems I Fall. 4 credits. Prerequisites: Electrical Engineering 210 and Mathematics 294 or equivalents. 3 lecs, 1 rec-computing session.

Formulation of circuit equations, steady-state response. Laplace transform and applications. System functions. State description of linear systems. Natural modes, initial conditions, forced response. Two-port circuit descriptions. Models for active circuits.

302 Electrical Signals and Systems II Spring. 4 credits. Prerequisite: Electrical Engineering 301. 3 lecs, 1 rec-computing session.

Single-sided and bilateral Laplace transforms. Applications of complex functions and contour integration to system response. Stability criteria. Fourier series and transforms. Discrete and fast Fourier transforms. Sampling.

303 Electromagnetic Theory I Fall. 4 credits.

Prerequisites: Physics 214 and Mathematics 294.

3 lecs, 1 rec-computing session.

Foundation of electromagnetic theory. Topics include Maxwell's equations; boundary conditions and the Laplace equation; plane waves, wave propagation and reflection at boundaries, the Poynting theorem; guided TEM, TM, and TE waves, impedance transformation, and matching. Introduction to simple antenna systems.

304 Electromagnetic Theory II Spring. 4 credits.

Prerequisites: Electrical Engineering 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; wave guide 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 241, Mathematics 294, and coregistration in 303.

3 lecs, 1 rec-computing session.

Introductory quantum mechanics and solid-state physics necessary for understanding lasers and modern solid-state electronic devices. Quantum mechanics is presented in terms of wave functions, operators, and solutions of Schrodinger's equation. Topics include the formalism and methods of quantum mechanics, the hydrogen atom, the structure of simple solids, energy bands, Fermi-Dirac statistics, and the basic physics of semiconductors. Applications studied include a simple metal, thermionic emission and the p-n junction.

310 Probability and Random Signals Spring.

4 credits.

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.

Prerequisites: Electrical Engineering 210 and coregistration 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: Electrical Engineering 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: Electrical Engineering 306.

3 lecs, 1 rec-computing session. R. Liboff.

Review of basic classical and quantum mechanical relations. Harmonic oscillator. Annihilation and creation operators. WKB technique. Superposition principle. Addition of angular momentum. Ladder operators. Clebsch-Gordon coefficients. Radiation from an atom. Selection rules. Pauli principle. Spin-orbit coupling. Spin states. Helium atom and hydrogen molecule. Magnetic resonance. Perturbation theory. The Born approximation. Nearly-free-electron model. Planck radiation law.

Interaction of radiation and matter. Density matrix. At the level of *Introductory Quantum Mechanics* by Liboff.

430 Introduction to Lasers and Optical Electronics Spring. 4 credits.

Prerequisite: Electrical Engineering 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 mechanical results, employs phenomenological theories and stresses applications to modern devices. Discussions of applications include the operating principles of a variety of important lasers, crystal optics with application to electro-optic and acousto-optic modulators, and an introduction to integrated optics. Labs present an opportunity to work with a variety of the lasers and processes discussed in lectures.

480 Thermal, Fluid, and Statistical Physics for Engineers Spring. 3 credits.

Prerequisite: Physics 214.

R. Liboff.

Extensive review of thermodynamic principles. Elementary theory of transport coefficients. Elements of fluid dynamics. Shockwaves. Central-limit theorem. Random walk. Electrical noise. Quantum and classical statistics. Black body radiation. Thermal properties of solids. Elementary descriptions of the p-n junction, superfluidity, superconductivity, and the laser.

531-532 Electronic Circuit Design 531, fall; 532, spring.

Fall, 4 credits; spring, 3 or 4 credits.

Prerequisites: Electrical Engineering 230 and 316.

3 lecs, 1 optional lab. N. H. Bryant.

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.

591-592 Senior Project 591, fall; 592, 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.

622 Neuroelectric Systems (also Biological Sciences 696) Spring. 3 credits (4 credits with lab.)

Prerequisite: either Electrical Engineering 301 or 621, or Biological Sciences 423 or 496; written permission of instructor required for lab. Offered alternate years.

Disc and demonstration to be arranged; lab to be arranged. M. Kim, R. Capranica.

Application of microprocessors for neuroelectric data acquisition and systems analysis. Lectures cover electrical activity of single nerve cells, electrodes and instrumentation techniques, analysis of electrophysiological data, and coding principles in the nervous system, as well as appropriate background material for the use of microprocessors in neurobiology. Laboratory exercises provide experience in the actual use of microprocessors.

623 Active and Digital Network Design Fall.

3 credits (4 credits with lab). Prerequisite: Electrical Engineering 301.

3 lecs, 1 lab. W. H. Ku.

Design of passive filters and matching networks. Active filter design using operational amplifiers. Design of transistor amplifiers. Digital signal processing. Z-transform and discrete Fourier transform (DFT). Design of nonrecursive and recursive digital filters. Fast Fourier transform (FFT) algorithms.

624 Computer Methods in Electrical Engineering Spring. 4 credits.

Prerequisite: Electrical Engineering 301.

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.

626 Advanced Digital Signal Processing Spring.

3 credits (4 credits with lab). Prerequisites: Electrical Engineering 623 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 Rabiner and Gold, *Theory and Application of Digital Signal Processing*.

627 Fundamentals of Analog and Digital Signal Circuits Fall. 4 credits.

Prerequisite: Electrical Engineering 302.

3 lecs.

Basic properties of analog networks. Linearity, time invariance, causality, passivity, stability. Analogous digital system properties. The scattering formalism. Applications to physical realizability, gain-phase design, and network transducer synthesis.

628 Analog and Digital Signal Circuit Theory and Applications Spring. 4 credits.

Prerequisite: Electrical Engineering 627 or 623 or equivalent.

3 lecs.

Amplitude-phase network behavior in the complex frequency domain. Transmission line properties; their applications to microwave circuit design and relation to digital filters. Analytic gain bandwidth theory. Computer-aided broad-band circuit design for lumped, distributed, passive, and active structures.

630 Physical Electronics of Solids Fall. 4 credits.

Prerequisites: Electrical Engineering 306 and 304 or 407 or permission of instructor.

3 lecs, 1 rec.

Topics include crystal symmetry and effects on device processing and operation; lattice vibrations; energy bands and their effects on device design and operation; hot-electron effects; transport of electrons and holes; optical properties; magnetic properties. These topics are discussed in terms of their influence on the operation of solar cells, photocathodes, microwave semiconductor devices, junction lasers and LEDs, and bubble and charge-control memories.

631-632 Semiconductor Electronics I and II 631, fall; 632, spring. 4 credits each term.

Prerequisites: Electrical Engineering 306 and 316.

3 lecs, 1 lab.

Properties of semiconductor materials; the physical theory of p-n junctions, metal-semiconductor contacts, and p-n junction devices; properties of semiconductor devices such as diodes and rectifiers, light-sensitive and light-emitting devices, field-effect and bipolar transistors, unijunction transistors, multilayer devices, and integrated circuits; device equivalent-circuit models; the applications of semiconductor devices as active or passive elements in discrete-component and integrated circuits for use as power supplies, power controls, amplifiers, oscillators and multivibrators, pulse circuits, gates and switches, etc.; transistor noise. At the level of *Semiconductor Electronics* by Ankrum.

633 Solid-State Microwave Devices and Subsystems I Fall. 3 credits.

Prerequisite: Electrical Engineering 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 transistor amplifiers; intermodulation effects; resistor and shot noise; noise temperature, fm noise.

634 Solid-State Microwave Devices and Subsystems II Spring. 3 credits. Prerequisite: Electrical Engineering 633.

2 lecs, 1 lab.

Basic theories of solid-state devices at microwave frequencies. Specific devices studied: varactors, avalanche diodes; transferred electron diodes; pnp oscillator diodes; tunnel diodes; pin diodes; and microwave transistors. Studies of experimental methods of characterizing these devices include use of H.P. network analyzer and other microwave equipment.

636 Integrated Circuit Technology Spring. 3 credits. Prerequisite: Electrical Engineering 631 or permission of instructor.

2 lecs, 1 lab.

Integrated circuit fabrication techniques applicable in the fields of computer hardware, telecommunication systems, and optoelectronics, with emphasis on device technology. Diffusion, oxidation, ion implantation; limits on device performance and device design, both MOS and bipolar. Compound semiconductors. At the level of current papers in *IEEE Transactions on Electron Devices*.

651-652 Electric Energy Systems I and II 651, fall; 652, spring. 4 credits each term. Prerequisite for 651: Electrical Engineering 316 or permission of instructor.

3 lec-recs, 1 lab-computing session. S. Linke. Engineering principles underlying operation of modern electric power systems under steady-state and transient conditions emphasizing major power-system parameters. Digital computer used as dynamic "laboratory" model of complex power systems for load-flow, fault, stability, and economic-dispatch studies. At the level of *Elements of Power System Analysis* (third ed.) by Stevenson.

655 Advanced Power Systems Analysis I Fall. 3 credits. Prerequisite: Electrical Engineering 302 and concurrent registration in 651, or permission of instructor.

R. J. Thomas, S. Linke.

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.

656 Advanced Power Systems Analysis II Spring. 3 credits. Prerequisites: Electrical Engineering 655 and concurrent registration in 652 or permission of instructor.

J. S. Thorp, C. Pottle.

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.

661 Error Control Codes Fall. 3 or 4 credits (4 with lab). Lab prerequisite: FORTRAN or PL/I.

3 lecs, 1 lab.

Development of codes for correction or detection of errors in digital data transmission, encoding and decoding algorithms and their implementation using

feedback shift register circuits or computer programs. The underlying algebraic theory (groups, Galois fields) is developed from the beginning as needed. The codes studied include Hamming codes, cyclic codes, BCH codes, Reed-Solomon codes, convolutional tree codes, and burst-correcting codes. Lab consists of computer implementation of algorithms covered in lecture.

662 Fundamental Information Theory Spring. 3 or 4 credits (4 with lab). Prerequisite: Electrical Engineering 310 or equivalent. Prerequisite for lab only: Electrical Engineering 661 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. Lab projects investigate problems of statistical characterization of sources and channels using computer simulation.

664 Decision Making and Estimation Fall. 4 credits. Prerequisite: Electrical Engineering 310 or equivalent.

Bayes, minimax, and Neyman-Pearson decision theories, including asymptotic error rates. Bayes and maximum likelihood estimation. Cramer-Rao bound, Fisher information, efficient and consistent estimates. Coherent signal-processing applied to estimation and decision-theory problems in radar, sonar and surveillance. Estimation of range, doppler, spectral moments. Ambiguity functions, synthetic aperture imaging.

667 Communication Systems I Fall. 4 credits. Prerequisite: Electrical Engineering 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.

668 Communication Systems II Spring. 4 credits. Prerequisite: Electrical Engineering 667 or equivalent.

3 lecs, 1 rec.

Analysis of multiterminal communication systems. Basic results on Markov chains and queueing theory are covered. Satellite communication systems and ground networks are investigated: stability properties, measures of performance, optimization of such systems.

671-672 Feedback Control Systems 671, fall; 672, spring. 3 credits each term (4 with lab). Prerequisite: Electrical Engineering 302 or permission of instructor.

System performance specifications, analysis and design of linear feedback control systems by root-locus and frequency-response techniques, classical cascade and feedback compensation methods. Sampled-data control systems design and analysis using z-transforms and including quantization effects, sample rate selection, and digital filter compensation techniques. Laboratory work consists of familiarization with system frequency-response measurements, transfer-function measurements, and transient-response measurements; also, design and compensation of linear positional and speed-control systems, and analysis and compensation of sampled-data systems. Emphasis is on correlation of theoretical and experimental results.

675 Computer Structures Fall. 4 credits. Prerequisite: Electrical Engineering 230.

3 lecs, 1 lab. N. M. Vrana.

Organization and design of digital computers, arithmetic hardware, and I/O systems. Introduction to microprocessors. Laboratory work concentrates on the design and construction of a small digital computer and a microprocessor-operator interface.

676 Microprocessor Systems Spring. 4 credits. Prerequisite: Electrical Engineering 675.

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.

677 Computer Processor Organization and Memory Hierarchy Fall. 4 credits. Prerequisites: Electrical Engineering 676 and 310, or permission of instructor.

Design and evaluation of processor and memory architectures are examined in light of actual implementations of both large-scale and small-scale (microprocessor) systems. Topics include: microprogramming and directly executable languages, number representation and instruction set trade-offs, parallel and pipelined architectures, interleaved memories, cache and virtual memories, multilevel memory hierarchies, and protection mechanisms.

678 Computer Input/Output and Distributed Architecture Spring. 4 credits. Prerequisite: Electrical Engineering 677 or permission of instructor.

Methods and approaches to input/output processing, device interface, selector and multiplexor channels, parallel processing, task partitions and resource allocations, distributed processing, interconnection topology, minicomputer and microcomputer networks, interprocessor communications.

679 Current Topics in Computer Engineering

Fall. 3 credits. Prerequisite: Electrical Engineering 677 or coregistration in 677.

2 lecs.

In-depth treatment of current and emerging computer engineering research and development activities. Topics vary from year to year and are chosen from research reports and published journal articles. Subjects may include: fault tolerant computing, reliability studies, innovative microcomputer structures, direct execution of high-level languages, and impact of very-large-scale integration technologies on computer organizations.

680 Elementary Plasma Physics and Gas Discharges Fall. 3 credits. Prerequisite: Electrical Engineering 303 and 304 or equivalent.

2 lecs, 1 lab, field trips. C. B. Wharton.

Principles and practices required to perform diagnostics of plasmas and intense particle beams. Coordinated lectures and ten experiments. Plasma breakdown, collisions, diffusion, sheaths. Reflex discharge. Discussion of macroscopic and microscopic measurements. Langmuir and other probes. Electromagnetic and spacecharge waves. Microwave and optical radiation. Intense particle beams. Methods for data collection and analysis.

681 Introduction to Plasma Physics (also A&EP 606) Fall. 4 credits. Prerequisites: Electrical Engineering 303 and 304 or equivalent. First-year graduate-level course; open also to exceptional fourth-year students at discretion of instructor.

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.

682 Advanced Plasma Physics (also A&EP 607) Spring. 4 credits. Prerequisite: Electrical Engineering 681.

3 lecs.

Boltzmann and Vlasov equations; waves in hot plasmas; Landau damping, microinstabilities; drift waves, low-frequency stability, collisional effects; method of dressed test particles; high-frequency conductivity and fluctuations; neoclassical toroidal diffusion, high powered beams.

683 Electrodynamics Fall. 4 credits. Prerequisite: Electrical Engineering 304 or equivalent.

3 lecs.
Maxwell's equations, electromagnetic potentials, integral representations of the electromagnetic field. Special theory of relativity. Radiation of accelerated charges. Cerenkov radiation. Optional topics: electrodynamics of dispersive dielectric and magnetic media; elementary quantum electrodynamics, second quantization, interaction of electromagnetic fields with atoms. At the level of *Classical Electrodynamics* by Jackson and *A Pedestrian Approach to Quantum Field Theory* by Harris.

684 Microwave Theory Spring. 4 credits.

Prerequisite: Electrical Engineering 304 or equivalent.
3 lecs. P. McIsaac.

Theory of passive microwave devices. Homogeneous and inhomogeneous waveguides. Nonreciprocal waveguide devices. Scattering matrix analysis of multiport junctions, resonant cavities, directional couplers, isolators, circulators. Periodic waveguides, coupled mode theory. At the level of *Introduction to the Theory of Microwave Circuits* by Kurokawa.

685–686 Upper Atmosphere Physics I and II

685, fall; 686, spring. 3 credits each term.

3 lecs.
Physical processes in the earth's ionosphere and magnetosphere, the solar corona, and the solar wind. Diagnostic techniques including radar and in situ observations; production, loss, and transport of charged particles in the ionosphere and magnetosphere; airglow; tides, winds, and gravity waves; electric fields generated by the solar wind and winds in the neutral atmosphere and their effects on transport processes; the equatorial and auroral electrojets; instabilities in space plasmas, structure of the solar corona and solar wind and their interaction with the magnetosphere; acceleration and drift of energetic particles in the magnetosphere; precipitation of particles and the aurora; magnetic and ionospheric storms.

[687 Electromagnetic Wave Propagation I] Fall. 3 credits. Not offered 1981–82.

3 lecs.
Some aspects of antenna theory; diffraction; refraction and ducting in the troposphere; propagation of radiowaves and cold plasma waves in the ionosphere and magnetosphere; Alfvén, whistler mode, and hybrid waves; the CMA diagram; WKB solutions of the coupled wave equations.]

[688 Electromagnetic Wave Propagation II]

Spring. 3 credits. Not offered 1981–82.

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.]

690 Fundamentals of Acoustics (also T&AM 666) Spring. 3 credits.

3 lecs, biweekly lab.
See T&AM 666 for course description.

691–699 Special Topics in Electrical Engineering 1–3 credits.

Seminar, reading course, or other special arrangement agreed upon between the students and faculty members concerned.

721 Theory of Linear Systems Fall. 4 credits.

Prerequisite: Electrical Engineering 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.

731 Quantum Electronics I Fall. 4 credits.

Prerequisites: Electrical Engineering 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.

732 Quantum Electronics II Spring. 4 credits.

Prerequisite: Electrical Engineering 731 or permission of instructor.

3 lecs, 1 rec-computing session.
A continuation of 731. 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.

733 Opto-Electronic Devices Fall. 4 credits.

Prerequisites: Electrical Engineering 304 and 630 or equivalent.

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.

734 Theory and Applications of Nonlinear Optics 4 credits. Prerequisite: Electrical

Engineering 731 or 733 or equivalent of Physics 572.

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.

735 Solid-State Devices I Fall. 4 credits.

Prerequisite: Electrical Engineering 630 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.

736 Solid-State Devices II Spring. 4 credits.

Prerequisite: Electrical Engineering 735 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 functions, stability and doping configurations of devices. Term paper.

738 Physics of Solid-State Devices Spring.

2–3 credits. Prerequisite: Electrical Engineering 736 or equivalent.

2 lecs.
Basic theory of electron and hole scattering in semiconductors. Examination of methods for obtaining high electric field solutions for the distribution function from the Boltzmann equation. Hot electron phenomena are reviewed emphasizing band-structure induced instabilities.

739 VLSI Digital System Design Fall. 3 credits.

Prerequisites: Electrical Engineering 636 and 676.
Theory of operation of MOS devices and circuits, and their fabrication; the foundations of LSI system design and implementation; examples of LSI system design; and topics of current research relating to system timing, arrays of extensible LSI devices, algorithms consistent with VLSI processor arrays, and organization of hierarchical and concurrent computing devices. A laboratory project is required.

[761–762 Random Processes in Electrical

Systems] 761, fall; 762, spring. 4 credits each term.

Prerequisites: Electrical Engineering 302 and 310. Not offered 1981–82.

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.]

763 Advanced Topics in Information Theory Fall.

4 credits. Prerequisites: Electrical Engineering 662 and either 761 or Mathematics 571 or permission of instructor.

3 lecs.
An in-depth treatment of an information theory research area. The topic varies from year to year and is chosen from the following subjects: source encoding (rate-distortion theory), decentralized systems, multiterminal communication networks, ergodic theory and information, and complexity and instrumentability of coding schemes.

764 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: comparative probability; quantitative probability; relative frequency interpretations; computational complexity; randomness; classical probability and invariance; induction; subjective probability.

771 Estimation and Control in Discrete Linear

Systems Fall. 4 credits. Prerequisites: Electrical Engineering 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.

772 Optimal Control and Estimation for Continuous Systems Spring. 4 credits.

Prerequisite: Electrical Engineering 771 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.

[773 Random Processes in Control Systems]

Spring. 4 credits. Prerequisites: Electrical Engineering 762 and 772. Not offered 1981–82.

3 lecs.

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.]

781 Kinetic Theory (also A&EP 761) Fall.

3 credits. Prerequisite: Electrical Engineering 407 or Physics 561, or permission of instructor. Offered alternate years.

2 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. Klimontovich formulation. At the level of *Introduction to the Theory of Kinetic Equations* by Liboff.

791–792 Electrical Engineering Colloquium 791, fall; 792, 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.

793–794 Electrical Engineering Design 793, fall;

794, 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.

795–799 Special Topics in Electrical Engineering 1–3 credits.

Seminar, reading course, or other special arrangement agreed upon between the students and faculty members concerned.

record, its formation, and interpretation of earth history. Introduction to the evolution of life and to fossils and their use in reconstructing past environments and dating rocks.

103 Earth Science Fall. 3 credits. (see Geol 105, Earth Science Laboratory).

3 lecs. A. L. Bloom.

Physical geography, including earth and lunar orbits that determine seasons and tides. Figure and structure of the earth; climatic regions; atmospheric and oceanic circulation; erosion by rivers, glaciers, wind, and waves; climatic change.

105 Earth Science Laboratory Fall. 1 credit. To be taken concurrently with Geol 103, Earth Science.

A. L. Bloom.

Astronomical determination of position and seasonal events. Topographic mapping and map interpretation. Minerals and rocks, world climatic regions.

107 Frontiers of Geology I Fall. 1 credit. May be taken concurrently with or after Geological Sciences 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 Geological Sciences 101 or 102.

1 lec. J. L. Cisne and staff.

Lectures by members of the department on selected fundamental topics of current interest such as plate tectonics, the evolution of mountain belts and island arcs, the deep structure of continents, ecology and evolution of fossil organisms, correlation of strata by fossils, sea-level changes, and fossil fuels.

[131 Geology and the Environment Fall.

3 credits. Field trips. Not offered 1981–82.

2 lecs, 1 lab.

The principles of geological science, with emphasis on the physical phenomena and rock properties as they influence the natural environments of man.]

262 Mineral and Energy Resources and the Environment Spring. 3 credits. No prerequisites.

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 Geological Sciences 325, 355–356, 376, and 388 may be taken by those who have successfully completed Geological Sciences 101–102 or the equivalent, or who can demonstrate to the instructor that they have adequate preparation in mathematics, physics, chemistry, biology, or engineering.

325 Structural Geology and Sedimentation

Spring. 4 credits. Prerequisite: Geological Sciences 101 or permission of instructor.

3 lecs, 1 lab. W. B. Travers.

Nature, origin, and recognition of geologic structures. Behavior of geologic materials. Geomechanical and tectonic principles applied to the solution of geologic problems. Introduction to the sedimentary processes and petrology of sedimentary rocks. Description, classification, provenance, transportation, depositional environment of sediments, and diagenesis of sediments.

345 Geomorphology Fall. 4 credits. Prerequisite: Geological Sciences 102 or permission of instructor.

2 lecs, 1 lab. A. L. Bloom.

Origin of land forms and description in terms of structure, process, and stage.

355 Mineralogy Fall. 4 credits. Prerequisite:

Geological Sciences 101 or permission of the 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.

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.

376 Sedimentology and Stratigraphy Fall.

4 credits. Recommended prerequisite: Geological Sciences 102.

2 lecs, 2 labs, field trips. J. L. Cisne, S. Bachman.

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 112 and Physics 208 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 Experiments and Techniques in Earth Sciences Spring. 2 credits. Prerequisites: Physics

207–208 and Mathematics 191–192 or equivalents, or permission of instructor.

S. Kaufman.

Lab and field experiments chosen in accordance with students' interests. Familiarization with instruments and techniques used in earth sciences. Independent work is stressed.

423 Petroleum Geology Fall. 3 credits.

Recommended prerequisite: Geological Sciences 325.

2 lecs, 1 lab. S. B. Bachman.

Introduction to hydrocarbon exploration and development. Source rock and fluid migration studies, oil and gas entrapment, reservoir rocks. Exploration techniques including basin analysis, subsurface mapping, seismic reflection methods and processing, seismic mapping, seismic stratigraphy. Drilling techniques, well logs and their use in stratigraphic and structural interpretations, leasing and economics, career development.

424 Tectonics of Orogenic Zones, Modern and Ancient Spring. 3 credits. Prerequisite: permission of instructors. Offered alternate years.

1 lec. D. E. Karig, W. B. Travers.

A comparative study of island arcs and mountain ranges.

[428 Geomechanics Spring. 3 credits.

Prerequisites: Mathematics 240 or 296; Geological Sciences 101. Not offered 1981–82.

3 lecs. D. L. Turcotte.

Geological Sciences Courses**Freshman and Sophomore Courses**

101 Introductory Geological Sciences Fall or spring. 3 credits.

2 lecs, 1 lab; evening exams, field trips.

W. B. Travers, fall; J. M. Bird, spring.

Understanding the natural earth; weathering, erosion, the evolution of coastlines and river valleys, glaciation, the origins of earthquakes and mountains, the genesis of volcanoes, and the drifting of continents. Studies of ground water, mineral deposits, petroleum, and coal. Recognizing major minerals and rocks, interpretation of topographic and geologic maps.

102 Introduction to Historical Geology Spring. 3 credits. Prerequisite: Geological Sciences 101 or permission of instructor.

2 lecs, 1 lab; evening exams. J. L. Cisne.

A continuation of 101. History of the earth and life in terms of evolutionary processes. The geologic

Use of mathematical analysis to explain such geological observations as ocean ridges—their thermal structure, elevation, heat flow, and gravity; ocean trenches—the structure and mechanics of the bending lithosphere; folding—buckling, viscous, and plastic flow; faulting—a detailed mechanical and geological study of the San Andreas fault; intrusives—geothermal power.]

431 The Earth's Crust: Structure, Composition, and Evolution Fall. 3 credits. Prerequisites: Geological Sciences 356 and 388.

3 lecs. L. D. Brown.
Structure and composition of the crust from geophysical observations, analysis of xenoliths, and extrapolation of petrological laboratory data. Radioisotopic considerations. The nature of the crust-mantle boundary. Thermal and rheological structure of the crust. Oceanic vs. continental crust. Origin and evolution of oceanic and continental crust.

[432 Digital Processing and Analysis of Geophysical Data Spring. 3 credits. Prerequisites: Geological Sciences 488 and familiarity with a programming language. Not offered 1981–82.

3 lecs. L. D. Brown.
Sampling theory. Fourier, Laplace, and Z-transform techniques. Spectral analysis. Temporal and spatial filtering. Geophysical modeling. Deconvolution, migration, and velocity analysis of reflection data.]

433 Interpretation of Seismic Reflection Data Spring. 3 credits. Prerequisite: Geological Sciences 488 or equivalent.

2 lecs, 1 lab. L. D. Brown, S. Kaufman.
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.

[454 Modern Petrology Fall. 3 credits. Prerequisite: Geological Sciences 356. Offered alternate years. Not offered 1981–82.

2½ lecs, ½ 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: Geological Sciences 355–356 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 ¹⁴C 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: Geological Sciences 355–356 or equivalent.

2 lecs, 1 lab. W. A. Bassett, R. W. Kay.
Crystallography and crystal chemistry of minerals and the methods of their study. Thermodynamic evaluation of homogeneous and heterogeneous equilibrium and disequilibrium processes of geologic interest. Topics include crystal symmetry, mineral structures, X-ray diffraction, mineral equilibrium, and diffusion in minerals.

461 Mineral Deposits I Fall. 4 credits. Prerequisite: Geological Sciences 365 or permission of instructor.

3 lecs, 1 lab, field trip. A. K. Gibbs.

Introduction to mineral resources; sedimentary and magmatic deposits; topics in geochemistry; ore microscopy; and exploration methods.

462 Mineral Deposits II Spring. 4 credits.

Prerequisite: Geological Sciences 461 or permission of instructor.

3 lecs, 1 lab, field trip. A. K. Gibbs.
Hydrothermal ore deposits; sulphide systems; related geochemical topics; mineral exploration.

471 Invertebrate Paleontology and Biostratigraphy Fall. 4 credits. Prerequisite:

Geological Sciences 102 and 376 or permission of instructor. Recommended prerequisite: some knowledge of biology.

2 lecs, 1 lab. J. L. Cisne.
Fossil invertebrates. Anatomy, classification, and identification of stratigraphically important groups. Applications of paleontology to geochronology and reconstruction of past environments.

473 Sedimentation and Tectonics Spring. 3 credits. Prerequisite: Geological Sciences 376 or permission of instructor.

2 lecs, 1 disc. S. B. Bachman.
Interaction of sedimentation and tectonics in development of stratigraphic sequences. Framework of deep ocean, active margin, passive margin, and cratonic sedimentation and stratigraphy. Seismic stratigraphy and the effects of sea-level changes on the stratigraphic record; sedimentary petrology and tectonism. Examples of margin and cratonic development throughout the geologic record. Problems with applying plate tectonic models to very old rocks.

483 Marine Tectonics Fall. 3 credits. Prerequisites: Geological Sciences 325 and a course in physics or geophysics.

2 lecs, possible field trips. D. E. Karig.
Study of geophysical and geological characteristics of the earth's crust beneath the oceans. Review of strengths and limitations of marine exploratory techniques. Emphasis on recent geologic data concerning plate margins in the ocean, especially the island arc systems.

[485 Physics of the Earth I Fall. 3 credits. Limited to upperclass engineers, majors in the physical sciences, and others by permission of instructor. Not offered 1981–82.

2 lecs, 1 lab. D. L. Turcotte.
Rotation and figure of the earth, gravitational field, seismology, geomagnetism, creep and anelasticity, radioactivity, earth's internal heat, continental drift, and mantle convection.]

488 Introduction to Geophysical Prospecting

Fall. 3 credits. Prerequisites: Physics 112–113 and Mathematics 191–192, or equivalents, or permission of instructor.

2 lecs. S. Kaufman.
Physical principles, instrumentation, operational procedures, and interpretation techniques in geophysical exploration for oil, gas, and minerals. Seismic reflection, seismic refraction, gravity, and magnetic and electrical methods of exploration.

490 Senior Thesis Fall or spring. 2 credits. Staff.

Thesis proposal to be discussed with adviser during the junior year. Participation requires acceptance of a thesis proposal by the faculty committee.

610–623 Seminars and Special Work Fall and spring. 2 or 3 credits each term. Prerequisite: permission of instructor.

Advanced work on original investigations in geological sciences. Topics change from term to term.

610 Tectonic and Stratigraphic Evolution of Sedimentary Basins W. B. Travers.

611 Petrology and Geochemistry R. W. Kay.

612 Advanced Geomorphology Topics A. L. Bloom.

613 Marine Geology D. E. Karig.

614 Sedimentary Petrology and Tectonics S. B. Bachman.

615 Topics in Mineral Resource Studies and Precambrian Geology A. K. Gibbs.

616 Plate Tectonics and Geology J. M. Bird.

617 Paleobiology J. L. Cisne.

618 Geophysics, Exploration Seismology L. D. Brown.

619 Earthquakes and Tectonics B. L. Isacks.

620 Exploration Seismology, Gravity, Magnetism S. Kaufman.

621 Geophysics, Seismology, and Geotectonics J. Oliver.

622 Geomechanics, Gravity, Magnetism, Heat Flow D. L. Turcotte.

623 Mineralogy and Crystallography, X-ray Diffraction, Microscopy, High-Pressure-Temperature Experiments W. A. Bassett.

642 Glacial and Quaternary Geology Spring. 3 credits. Prerequisite: Geological Sciences 345 or permission of instructor.

2 lecs, 1 lab; several Saturday field trips.
A. L. Bloom.
Glacial processes and deposits and the stratigraphy of the Quaternary.

681 Geotectonics Fall. 4 credits. Prerequisite: permission of instructor.

2 lecs. J. M. Bird.
Theories of orogeny; ocean and continent evolution. Kinematics of lithosphere plates. Rock-time assemblages of modern oceans and continental margins, and analogs in ancient orogenic belts. Time-space reconstructions of specific regions. Problems of dynamic mechanisms—corollaries and evidence from crustal features.

685 Advanced Geophysics I Fall. 3 credits. Prerequisite: Geological Sciences 388 or 485.

3 lecs. D. L. Turcotte.
Mantle convection, heat flow, the driving mechanism for plate tectonics, the energy balance, definition of the lithosphere.

686 Advanced Geophysics II Spring. 3 credits. Prerequisite: Geological Sciences 388 or 485.

3 lecs. D. L. Turcotte.
Gravity, figure of the earth, earth tides, magnetism, mechanical behavior of the lithosphere, changes in sea level.

687 Seismology I Fall. 3 credits. Prerequisite: T&AM 611 or equivalent. Offered alternate years.

3 lec-recs. B. L. Isacks.
Generation and propagation of elastic waves in the earth. Derivation of the structure of the earth and the mechanism of earthquakes from seismological observations.

[688 Seismology II Fall. 3 credits. Prerequisite: Geological Sciences 687. Not offered 1981–82.

B. L. Isacks.
A continuation of Geological Sciences 687.]

Field Courses

[601 Intersession Field Trip] January intersession. 1 credit. Prerequisites: Geological Sciences 101–102 or equivalent and permission of instructor. Travel and subsistence expenses to be announced. Not offered 1981–82.

A trip of one week to ten days in an area of interesting geology in the lower latitudes. Interested students should contact the instructor during the early part of the fall semester.]

604 Western Adirondack Field Course Spring. 1 credit. Students should be prepared for overnight camping and will have to pay for their own meals. One week at the end of the spring semester. W. A. Bassett.

Field mapping methods, mineral and rock identification, examination of Precambrian metamorphic rocks and lower Paleozoic sediments, talc and zinc mines.

[704 Western Field Course] Spring. 6 credits. Prerequisites: four courses in Geological Sciences at the 300 level, and permission of instructor. Students should be prepared for overnight camping and will have to pay for their own meals. Not offered 1981–82.

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; multiphase mountain building near Dixie Valley, Nevada; sedimentology and block faulting of the Uinta Mountains, Utah. Five-day raft trip on the Green River through the core of the Uinta mountains. Visit to an oil field in California and a mine in Nevada. Lectures and field trips with local experts.]

Materials Science and Engineering Courses

Undergraduate Courses

201 Elements of Materials Science Fall or spring 3 credits. Relations between atomic structure and macroscopic properties of such diverse materials as metals, ceramics, polymers. Properties discussed include magnetism, superconductivity, insulation, semiconductivity, mechanical strength, and plasticity. Applications to microelectronics, desalination by reverse osmosis, superconducting power transmission lines, synthetic bones and joints, etc. Extensive use of slides, audiotutorial systems, movies.

261 Introduction to Mechanical Properties of Materials (also Engr 261) Fall or spring. 3 credits. 2 lecs, 1 rec or lab. See description under Engineering Basic Studies.

262 Introduction to Electrical Properties of Materials (also Engr 262) Spring. 3 credits. 2 lecs, 1 rec or lab. See description under Engineering Basic Studies.

331 Structure and Properties of Materials Fall. 4 credits. 3 lecs, 1 lab.

The most widely used techniques to investigate materials such as metals, glasses, ceramics, and polymers; associated laboratory work teaches the use of the optical microscope and X-ray diffraction, and exposes the student to electron microscopy and the use and application of the scanning electron microscope. Discussion of how knowledge of

microscopic structure obtained with these techniques can be used to predict and understand important engineering properties.

332 Electrical and Magnetic Properties of Materials Spring. 3 credits. 3 lecs.

An introduction to electrical and magnetic properties of materials with emphasis on structural aspects. Classification of solids, charge and heat transport in metals and alloys, semiconductors and insulators, principles of operation and fabrication of semiconductor devices, behavior of dielectric and magnetic materials, magnetic devices, phenomenological description of superconducting materials.

333 Research Involvement I Fall. 3 credits. Prerequisite: approval of department. Semi-independent research project in affiliation with faculty member and research group of the department.

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 various phases of materials and the changes that occur when temperatures and pressures change are considered by developing the laws of thermodynamics and applying them to different systems. The use of phase diagrams to predict the phase(s) of an alloy system at any given temperature and pressure in order to understand heat treatment such as the hardening of aluminum alloys and the quenching of steels. Phase transformations under conditions of quenching and their influence on hardness. Guidelines for heat treatment of steels.

336 Kinetics, Diffusion, and Phase Transformations Spring. 3 credits. 3 lecs.

Introduction to 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.

345 Materials and Manufacturing Processes (also M&AE 311) Fall or spring. 3 credits. May be taken in addition to MS&E 261. Prerequisite: T&AM 202 or permission of instructor. 2 lecs, 1 lab. See M&AE 311 for course description.

441 Microprocessing of Materials Fall. 3 credits. 3 lecs, occasional lab.

The materials technology of electronic and magnetic devices; single crystals as well as thin films. Growth and purification (zone refining) of semiconducting crystals; doping procedures, including ion implantation; composition control; oxide growth; photoetching. Preparation of thin films by vapor deposition; sputtering; plating; evaluation of film geometry and composition. Material aspects of recent devices (superlattice growth, magnetic amorphous bubbles, etc.)

442 Macroprocessing of Materials Spring. 3 credits. 3 lecs, occasional lab.

Control of chemical composition through smelting, reaction, and refining processes; applications to iron and steel, aluminum, refractories, etc. Shape control; casting and solidification; welding; mechanical shaping through rolling, drawing, etc. Deformation and annealing, textures; relation to material properties. Thermomechanical treatments for control of material properties.

443–444 Senior Materials Laboratory 443, fall; 444, spring. 3 credits.

Experiments are available in structural studies, properties of materials, deformation and plasticity, mechanical and chemical processing, phase transformation, surface physics, etc.

445 Mechanical Properties of Materials Fall. 3 credits. 3 lecs.

The mechanical properties of materials and how they can be understood and analyzed in terms of microscopic irregularities (lattice defects) in perfect regular crystals. The general relation between stress and strain; the concept of equivalent stresses and strains. How the concept of local defects can explain many aspects of plastic flow, creep, fatigue, and rupture in classical and new engineering materials. Application of these concepts to the development of improved materials.

446 Current Topics in Materials Spring. 3 credits. 3 lecs.

Coordinated lectures on topics of current interest, such as biomaterials, fuel cells, composite materials, materials problems in power generation and distribution systems, stress corrosion cracking.

447 Introduction to Ceramics Fall. 3 credits. Prerequisite: MS&E 261 or permission of instructor. 3 lecs.

Designed to develop an understanding of ceramic materials and processes for engineering applications. The crystallographic nature of some ceramics, and structural imperfections that can occur. Ionic motions in crystalline ceramics and their relation to properties and forming methods (such as sintering). Mechanical properties, such as cracking, in terms of microscopic mechanisms. The properties of some new ceramic materials, such as silicon nitride and barium titanate, in special applications.

448 Properties of Solid Polymers Spring. 3 credits. 3 lecs.

Inorganic, organic, and biological polymers. Physical properties of long-chain molecules. Molecular weight distribution and measurement. Gelation and the properties of networks. Rubber elasticity. Amorphous and crystalline polymers for engineering use; their structure and mechanical and thermal properties. Elements of composite material properties.

450 Physical Metallurgy Spring. 3 credits. Control of microstructure and the relationships between microstructure and engineering properties of commercial alloys. Includes studies of iron and steel, aluminum, titanium, magnesium and copper-bond alloys, selected superalloys and cemented carbides. Emphasis is placed on phenomena and properties which make alloys useful as engineering materials. Topics include strengthening mechanisms, hardenability, environmental factors, and failure analysis.

452 Processing of Glass, Ceramic, and Glass-Ceramic Materials Spring. 3 credits. Conventional and unconventional techniques for processing glass, ceramic, and glass-ceramic materials. Emphasis is given to the science of processing and to case studies. Applications include vapor processes for high-purity optical fibers, hot-pressing ceramic turbine blades, and nucleation of crystalline phases in glass to prepare photosensitive materials. This course is team taught with two scientists from the research and development laboratory of Corning Glass Works.

455 Analysis of Manufacturing Processes (also M&AE 512) Spring. 3 credits. Prerequisite: M&AE 311. 3 lecs. See M&AE 512 for course description.

Graduate-Level Professional Courses

553–554 Special Project 553, fall; 554, spring.
6 credits each term.
Research on a specific problem in the materials area.

Graduate Core Courses

601 Thermodynamics of Materials Fall. 3 credits.
Basic statistical thermodynamics. Partition function and thermodynamic state functions. Distributions. Laws of thermodynamics. Free-energy functions and conditions of equilibrium. Chemical reactions. Statistics of electrons in crystals. Heat capacity. Heterogeneous systems and phase transitions. Lattice models of 1-, 2-, 3-dimensional interacting systems. Statistical thermodynamics of alloys. Free-energy and phase diagrams. Order-disorder phenomena. Point defects in crystals. Statistical thermodynamics of interfaces. Nucleation phenomena.

602 Elasticity and Physical Properties of Crystals Fall. 3 credits.
Cartesian tensors, elastic stress and strain, constitutive relations between stress and strain, symmetry of crystals, generalized tensor representation of elasticity and other reversible and irreversible properties of crystals, mathematical theory of infinitesimal elasticity with applications including wave propagation and stress fields of dislocations, mathematical theory of yield stress and plasticity, origin of elastic behavior, including rubberlike behavior. At the level of *Physical Properties of Crystals* by Nye.

603 Structure of 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 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.

605 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, et cetera. 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/liquid. Reactions produced by irradiation.

Related Course in Another Department

Introductory Solid-State Physics (Physics 454)

Further Graduate Courses

[610 Principles of Diffraction (also A&EP 711)] Fall. 3 credits. Offered alternate years. Not offered 1981–82.
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.]

614 Electron Microscopy 3 credits.
Electron optics, Abbé 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.

669 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.

701 Electrical and Magnetic Properties of Materials 3 credits. Prerequisite: Physics 454 or equivalent.
Electronic transport properties of metals and semiconductors, semiconductor devices, optical and dielectric properties of insulators and semiconductors, laser materials, dielectric breakdown, structural aspects of superconducting materials, ferromagnetism and magnetic materials. At the level of *Physics of Semiconductor Devices* by Sze, *Ferromagnetism* by Bozworth, and current review articles.

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 Physics of Solid Surfaces and Interfaces (also A&EP 762) Spring. 3 credits. Prerequisites: MS&E 601 and some knowledge of solid-state physics. See A&EP 762 for course description.

704 Advanced Topics in Crystal Defects 3 credits. Prerequisites: MS&E 601, 602, and 603, or equivalent.
The structure and properties of point, line, and planar crystal defects treated from a fundamental point of view. Thermodynamics and kinetics of point defects. Atomistic and continuum theories of dislocations. Thermodynamic treatment of grain boundaries. Structure of grain boundaries. Emphasis given throughout to interactions between the various types of defects and to their roles in important phenomena such as diffusion, precipitation, plasticity, radiation damage.

705 The Effects of Radiation on Materials 3 credits.
Cross section for atom displacement; orientation dependence of the threshold energy; interatomic potentials; the atomic collision cascade; focusing of atomic collisions; mass transport along collision spectra within a cascade; range concepts and measurements in polycrystalline and single crystal

metals and semiconductors; channeled particles and the effect of crystal imperfections on the range; Rutherford back-scattering and channeling and their application to the lattice location of impurity atoms; sputtering of single and polycrystalline metals; recovery mechanisms for radiation damage; void formation in metals irradiated to high fluences and the problem of swelling in liquid metal fast breeder reactors; the first-wall problem in controlled thermonuclear reactors. At the level of *Defects and Radiation Damage in Metals* by M. W. Thompson, *The Observation of Atomic Collisions in Crystalline Solids* by R. S. Nelson, *Ion Bombardment of Solids* by G. Carter and J. S. Colligon, and selected papers and review articles.

706 Amorphous Semiconductors 2 credits.
Prerequisite: knowledge of the theory of crystalline semiconductors on the level of Kittel.
The preparation, characterization, and electronic transport of amorphous semiconductors from an experimental point of view. Particular emphasis is given to amorphous, hydrogenated Si. Some potential device applications, such as in amorphous Si solar cells and the metal-base transistor, are described.

707 Solar Energy Materials 3 credits.
3 lects.
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.

775 Advanced Topics in Mechanical Properties 3 credits. Prerequisite: MS&E 604 or permission of instructor.
3 lects.

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 or spring. Credit variable.
Supervised studies of special topics in materials science.

798 Materials Science and Engineering Colloquium Fall and 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 science, especially in connection with new research.

799 Materials Science Research Seminars Fall and 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 and 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 and 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 Courses

General and Required Courses

101 Naval Ship Systems (also Nav S 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.

221 Thermodynamics (also Engr 221) Fall or spring. 3 credits. Prerequisites: Mathematics 191 and 192, Physics 112. See description under Engineering Basic Studies.

302 Technology, Society, and the Human Condition Spring. 3 credits. Limited to upperclass engineers and other students who have received permission of instructor. S-U grades optional. 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 or spring. 3 credits. May be taken in addition to MS&E 261. Prerequisite: T&AM 202 or permission of instructor.

2 lec, 1 lab. Material structures. Physical and metallurgical properties of materials and their control by mechanical and metallurgical means. Manufacturing processes. Emphasis on correlations among design, material properties, and processing methods.

323 Introductory Fluid Mechanics Fall or spring. 4 credits. Prerequisites: M&AE 221, T&AM 202 and 203, or permission of instructor.

4 recs. 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 and Transport Processes Fall or spring. 3 credits. Prerequisite: M&AE 323.

1 lec, 2 recs. Conduction of heat in steady and unsteady situations. Fin surfaces and systems with heat sources. Emission and absorption of radiation, and radiative transfer between surfaces. Forced and natural convection of heat arising from flow around bodies and through ducts. Combined modes of transfer and heat exchangers.

325 Mechanical Design and Analysis Fall or spring. 4 credits. Prerequisites: T&AM 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 Fall or spring. 4 credits. Prerequisite: M&AE 325. Dynamic behavior of mechanical systems, modeling, analysis techniques and applications, digital- and analog-computer simulation, balancing of rotating

and reciprocating machinery, vibrations of single and multi-degree-of-freedom systems, linear control systems. PDF control, stability analysis.

327 Mechanical Engineering Laboratory Fall. 4 credits. Prerequisites: M&AE 323, 325, and concurrent registration in M&AE 324 and 326.

1 lec, 2 labs. 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.

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: OR&IE 260 or 270 or equivalent. S. L. Phoenix. Classic system reliability, hazard function concepts, reliability bounds; static and time-dependent material strength models, static and dynamic fatigue, weakest flaw models; structural system reliability, static and time-dependent parallel member models. Monte Carlo simulation of structural systems with load sharing.

486 Automotive Engineering Spring. 3 credits. Prerequisite: M&AE 325.

Selected topics in the analysis and design of vehicle components and vehicle systems. Emphasis is on automobiles, trucks, and related vehicles. Powerplant, driveline, brakes, suspension, and structure. Other vehicle types may be considered.

489 Computer-Aided Design Spring. 3 credits. Limited to juniors and seniors.

2 lec-recs, 1 computing lab; term project. A broad introduction to computational methods in mechanical design.

512 Analysis of Manufacturing Processes (also MS&E 455) Spring. 3 credits. Prerequisite: M&AE 311.

3 lec. Review of basic principles of plasticity with coverage of bound theorems and slipline theory. Analytical treatment of metal cutting and metal forming processes; conventional and nontraditional manufacturing methods; production systems and machine tool dynamics.

513 Materials Engineering Spring. 3 credits.

Prerequisite: M&AE 311 or MS&E 261 or permission of instructor. Designed to aid in the design, selection, and use of engineering materials. Theory and practice of extractive, physical, and mechanical metallurgy. Corrosion principles and control; metallurgical failure analysis and prevention; mechanical properties of polymers, ceramics, and composite materials.

514 Numerical Control in Manufacturing Fall. 3 credits. Prerequisite: upperclass standing in College of Engineering.

3 lec. 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.

563 Mechanical Components Spring. 3 credits. Prerequisite: M&AE 325.

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 Spring. 3 credits. Prerequisites: T&AM 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.

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.

570 Mechanical and Aerospace Structures II

Spring. 3 credits. Prerequisite: M&AE 569 or permission of instructor. 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 typical general-purpose finite element programs (e.g., NASTRAN). Selected engineering applications. Term project.

575 Microprocessor Applications Fall. 3 credits. Enrollment limited; intended for graduate students; open to qualified undergraduates who have permission of instructor. Prerequisite: background in basic laboratory electronics assumed.

D. L. Taylor. Microprocessors for data acquisition and control; applications drawn from experiments and systems in mechanical engineering. Review of microcomputer systems, an introduction to digital circuitry, a survey of transducers and digital sensors. Basic concepts of digital control and detailed consideration of bus structure, data representation, interfacing, and input-output operations. Emphasis on single-chip and single-board microprocessors, with some extension to larger commercial systems. Independent lab work.

577 Mechanical Vibrations Spring. 3 credits.

Open to qualified undergraduates. Prerequisite: M&AE 326 or equivalent.

2 recs, 1 lab. 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 Fall. 3 credits.

Open to qualified undergraduates. Prerequisite: M&AE 326 or permission of instructor.

2 recs, 1 lab. R. M. Phelan. Further development of the theory and implementation of feedback control systems, with particular emphasis on the application of pseudo-derivative-feedback (PDF) control concepts to linear and nonlinear systems.

587 Dynamics of Vehicles Fall; offered on

demand. 3 credits. Prerequisite: T&AM 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. 3 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 in the analyses of mechanical deformation processes that are nonlinear and influenced by coupling to thermal or electrical behavior. Elastic, elastoplastic, viscoplastic, and thermally coupled analyses applied to problems in large deformation, bulk forming, polymer flows, and welding.

[672 Experimental Methods in Machine Design] Fall. 3 credits. Prerequisite: M&AE 325 or equivalent. Not offered 1981–82.

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. 3 credits. Prerequisite: M&AE 577 or equivalent. Offered alternate years. Not offered 1981–82.

D. L. Taylor.
Vibratory response of multi-degree-of-freedom systems, matrix formulation, concepts of impedance, mobility, frequency response, and complex mode shapes. State-of-the-art techniques such as FFT, sine sweep, and single-point random excitation. Nonlinear vibrations, limit cycle analysis, parametric resonance, self-excited oscillations, and nonconservative systems. Random vibrations and stochastic excitation. Introduction to vibrations of elastic bodies.]

[679 Digital Simulation of Dynamic Systems] Fall. 3 credits. Open to qualified undergraduates who have permission of instructor. Prerequisite: previous exposure to systems dynamics and digital programming. Offered alternate years. Not offered 1981–82.

J. F. Booker.
Modeling and representation of physical systems by systems of ordinary differential equations in 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.]

680 Design of Complex Systems Offered on demand. 3 credits. Prerequisite: permission of instructor.

Two 2-hour meetings. R. L. Wehe.
Seminars rely heavily on student participation in discussing frontier problems such as systems for space and underwater exploitation, salt water conversion, and transportation. Reports including recommendations and the reasoning that led to them are required.

682 Hydrodynamic Lubrication: Fluid-Film Bearings Fall; offered on demand. 3 credits.

J. F. Booker.
Designed to acquaint those having a general knowledge of solid and fluid mechanics with the special problems and literature currently of interest in various fields of hydrodynamic lubrication. General topics include equations of viscous flow in thin films, self-acting and externally pressurized bearings with liquid and gas lubricant films, bearing-system dynamics, and computational methods. Also selected special topics, such as elastohydrodynamic lubrication.

[684 Advanced Mechanical Reliability] Fall. 3 credits. Prerequisite: M&AE 483 or permission of instructor. Offered alternate years. Not offered 1981–82.

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 reliability, simulation, and computation in mechanical structures, coherent systems and monotone load-sharing, stochastic failure of bundles and composites.]

685 Optimum Design of Mechanical Systems

Spring. 3 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 or other students who have received permission of instructor. 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.
A. R. George.
Sound propagation, transmission, and absorption. Sound radiation by surfaces and flow. Loudspeakers. Hearing, music, noise, and noise control criteria. Room acoustics and noise control techniques.

449 Combustion Engines Fall. 3 credits.

Prerequisite: M&AE 221.
3 recs.
Introduction to combustion engines, with emphasis on application of thermodynamics and fluid dynamics and on control of undesirable exhaust emissions. Emphasis on performance, efficiency, and emissions of current and future spark-ignited and diesel reciprocating engines. Discussion of alternative engines and fuels.

459 Plasma Energy Systems Spring; offered on demand. 3 credits. Prerequisite: Physics 214.

Fundamental aspects of plasma physics. An elementary treatment of principles on which the concepts of controlled thermonuclear (fusion) reactors are based. Comparisons between fission and fusion systems and treatment of other plasma devices (e.g., MHD converters) as time permits.

506 Aerospace Propulsion Systems Spring.

3 credits. Prerequisite: M&AE 323 or permission of instructor. Offered alternate years.
3 recs. F. C. Gouldin.
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 305 and T&AM 203 or permission of instructor. Offered alternate years. Not offered 1981–82.
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 *Stability and Control of Airplanes and Helicopters* by Seckel.]

530 Fluid Dynamics Fall. 3 credits. Prerequisite: M&AE 323; senior or graduate standing or permission of instructor.

Inviscid fluid dynamics and aerodynamics, including incompressible and supersonic flows, flow over bodies, lift and drag. One-dimensional steady and unsteady compressible flows. Shock waves, wave drag, flow in jet and rocket engines. Courses 530 and 531 are of interest primarily to seniors and M.Eng. students; however, incoming M.S. or Ph.D. students who will not major in fluid mechanics but need competence in problem solving and basic problem formulation should be interested also. The courses may be taken independently or as a sequence.

531 Boundary Layers Spring. 3 credits.

Prerequisite: M&AE 323; senior or graduate standing or permission of instructor.
Navier-Stokes equations for laminar and turbulent flows. Boundary layers, jets, wakes, elementary turbulence modeling. Skin friction, separation, drag, aerodynamic heating. 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 elementary solving and basic problem formulation should be interested also. The courses may be taken independently or as a sequence.

536 Turbomachinery and Applications Spring.

3 credits. Prerequisite: M&AE 323 or permission of instructor.
3 recs.
Aerothermodynamic design of turbomachines in general, energy transfer between fluid and rotor in specific types, axial and radial units, compressible flow. Three-dimensional effects, surging.

543 Combustion Processes Spring. 3 credits.

Prerequisites: M&AE 323, 324.
3 recs.
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 Utilization Fall. 3 credits.

Prerequisite: M&AE 221 or equivalent. Offered alternate years.
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. 3 credits. Prerequisite: M&AE 221 or equivalent. Offered alternate years.
3 lec.
Primarily a survey of methods for the direct conversion of heat into electrical energy, with emphasis on efficiency, maximum power, practical applications, and limitations. Thermoelectric generators and refrigerators. Thermionic generators. Solar cells. Batteries. Fuel cells.

556 Power Systems Fall. 3 credits. Prerequisite: M&AE 323 or equivalent.

F. K. Moore.
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.

557 Future Energy Systems Seminar Spring. 3 credits. Prerequisite: an energy-related course. Options for future energy-conversion systems or power generation, transportation, and other end-use applications. Technical feasibilities, benefits, and environmental impacts are considered. Classes or seminars based on study projects that reflect student preparation and interests, conducted with faculty advice.

601 Foundations of Fluid Dynamics and Aerodynamics Fall. 3 credits. Prerequisite: graduate standing or permission of instructor. Foundations of fluid mechanics from an advanced viewpoint. Aspects of kinetic theory as it applies to the formulation of continuum fluid dynamics. Surface phenomena and boundary conditions at interfaces. Fundamental kinematic description 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. 3 credits. Prerequisite: M&AE 632 or equivalent. Open to qualified undergraduates who have permission of instructor. Basic equations, vorticity and flow development. Incompressible potential flow theory; singularity, distributions, airfoil, wing, and slender body theory, complex-variable methods, unsteady phenomena.

603 Compressible Aerodynamics Fall. 3 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. Expansion procedures and singular perturbation problems. Linearized supersonic flow, wing theory, wave drag. Nonlinear theories of transonic and supersonic flow.

608 Physics of Fluids I Fall. 3 credits. Elementary kinetic theory of gases and a microscopic derivation of the Navier-Stokes equations. Atomic and molecular structure. Statistical mechanics of gases and of chemically reacting gas mixtures. Chemical-reaction-rate theory.

609 Physics of Fluids II Spring, on demand. 3 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. 3 credits. Offered on demand. 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. Magnetically driven shock waves are also considered, if time permits.

630 Atmospheric Turbulence and Micrometeorology Spring. 3 credits. Offered alternate years. Open to qualified undergraduates with permission of instructor. 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. 3 credits. Prerequisite: permission of instructor. Offered alternate years. 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 modification of combustion systems for energy efficiency improvement.

650 Transport Processes I Fall. 3 credits. Prerequisite: graduate standing or permission of instructor. K. E. Torrance. Advanced treatment of heat conduction and thermal radiation. Differential and integral conduction equations. Exact and approximate solutions; superposition; phase change boundaries. Radiative transport equation and Kirchhoff's laws. Emission and scattering by real surfaces and by gases. Heat exchange in enclosures.

651 Transport Processes II Spring. 3 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 Spring. 3 credits. On demand. 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. 3 credits 2 lects, 1 lab. F. C. Gouldin. Study of experimental techniques for measuring pressure, temperature, velocity, and composition of gases, with emphasis on experimental capabilities and principles underlying the techniques. Topics include laser velocimetry, hot-wire anemometry, and spectroscopy.

704 Viscous Flows Spring; offered on demand. 3 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 at small Reynolds numbers. The boundary layer approximation; general properties. Transformations for compressibility and axisymmetric effects. Approximate methods of calculation. Unsteady problems. Stability of laminar flows.

707 Aerodynamic Noise Theory Offered on demand. 3 credits. Prerequisites: 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.

734 Turbulence and Turbulent Flow Fall. 3 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. 3 credits. Prerequisites: M&AE 601 or permission of instructor. S. Leibovich. Review of classical fluid mechanics. Rotating coordinate systems. Linearized theory for rapidly rotating fluids. Inviscid regions, viscous layers. Spinup. Motions past objects. Waves in rotating fluids. Motions in concentrated vortices. Vortex breakdown in swirling flows. Boundary layer interactions.

737 Numerical Methods in Fluid Flow and Heat Transfer Spring. 3 credits. Prerequisites: graduate standing and some FORTRAN programming experience. K. E. Torrance. Discretization procedures for the Navier-Stokes and scalar transport equations. Finite differences and finite elements. Analysis of accuracy, stability, and convergence. Survey and comparison of current methods with applications. Assigned problems are solved with a digital computer.

738 Nonlinear Wave Propagation Offered on demand. 3 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

490 Special Investigations in Mechanical and Aerospace Engineering Fall or 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 Design Project in Mechanical Engineering Fall and spring. 3 credits each term. Intended for students in M.Eng.(Mechanical) degree program. Design of an engineering system or a device of advanced nature. Projects by individuals or small groups, sometimes in collaboration with an external organization.

592 Seminar and Design Project in Aerospace Engineering Fall and 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 or spring. Credit to be arranged. Limited to graduate students.

695 Special Topics in Mechanical and Aerospace Engineering Fall or spring. Credit 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 Mechanical and Aerospace Engineering Research Conference Fall and spring. 1 credit each term.

For graduate students involved in research projects. Short presentations on research in progress by students and staff.

799 Mechanical and Aerospace Engineering Colloquium Fall and spring. 1 credit each term. Credit limited to graduate students. All students and staff invited to attend.

Lectures by Cornell staff members, graduate students, and visiting scientists on topics of 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 the director. Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the staff.

990 Research in Mechanical and Aerospace Engineering Credit to be arranged. Prerequisite: candidacy for Ph.D. degree in mechanical or aerospace engineering or approval of the director. Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the staff.

Nuclear Science and Engineering Course

A number of courses in nuclear science and engineering are offered through the School of Applied and Engineering Physics; see A&EP 303, 304, 609, 612, 613, 633, 634, 636, 638, 651, and 652.

605 Interaction of Radiation and Matter Spring. 4 credits. Prerequisite: a course in modern physics including quantum mechanics.

3 lecs. V. O. Kostroun. Quantization of the electromagnetic field; relativistic wave equation of the electron; electrons interacting with radiation field—emission, absorption, dispersion, photoelectric effect. Compton scattering, scattering of two electrons, bremsstrahlung, pair production, and annihilation; passage of heavy charged and neutral particles through matter. Examples and applications from low-energy nuclear, plasma, and solid-state physics.

Operations Research and Industrial Engineering Courses

260 Introductory Engineering Probability (also Engr 260) Fall or spring. 3 credits. Prerequisite: first-year calculus.

3 lecs. See description under Engineering Basic Studies.

270 Basic Engineering Probability and Statistics Fall or spring. 3 credits. Prerequisite: first-year calculus.

3 lecs. See description under Engineering Basic Studies.

320 Optimization I Fall or spring. 4 credits. Prerequisite: Mathematics 293 or 221.

3 lecs, 1 lec-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 lec-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 or 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 Spring. 4 credits. Prerequisite: OR&IE 260 or equivalent.

3 lecs, 1 lec. 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 or spring. 4 credits. Prerequisite: OR&IE 260 or equivalent.

3 lecs, 1 lec. Provides a working knowledge of basic statistics as it is most often applied in engineering and a basis in statistical theory for continued study. Topics include a review of distributions of special interest in statistics; testing simple and composite hypotheses; point and interval estimation; correlation; linear regression; curve fitting.

410 Industrial Systems Analysis Fall or spring. 4 credits. Prerequisites: OR&IE 350 and 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. Not offered 1981–82.

2 lecs, 1 lec. 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 Spring. 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. 3 credits. Prerequisite: OR&IE 320 or permission of instructor.

3 lec-recs. Basic concepts of graphs, networks, and discrete optimization. The use of finite mathematical techniques to model contemporary problems selected from operations research, including voting procedures and decision making, efficient and equitable allocations, energy and environment, traffic and urban systems.

435 Introduction to Game Theory Fall. 3 credits. 3 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. Structure theory for games arising from complex organizations.

[462 Introductory Engineering Stochastic Processes II] Fall. 4 credits. Not offered 1981–82. Prerequisite: OR&IE 361 or equivalent.

3 lecs, 1 lec. 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 lec. Sample size calculations for one- and two-sample tests; theory of multiple linear regression and applications to problems in engineering and the sciences, including graphic and analytic techniques useful in model building; analysis of data from experiments with qualitative factors including one-way and two-way Anova models. Use of the computer as a tool for statistics is stressed.

[472 Statistical Decision Theory] Spring. 3 credits. Prerequisite: OR&IE 471 or equivalent. Not offered 1981–82.

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.]

516 Mathematical Models—Development and Application Fall. 4 credits. Prerequisites: OR&IE 320 and 361 or permission of instructor.

4 lec-labs. A laboratory course concerned with structuring problems and operational systems as mathematical models. A sequence of situations for which students must construct representative models is considered. Models are examined for their usefulness in analysis, synthesis, and design.

519 Industrial Engineering Fieldwork Fall or 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.

551 Advanced Engineering Economic Analysis Spring. 4 credits. Prerequisites: OR&IE 350 and knowledge of linear programming and statistics, or permission of instructor.

3 lecs, 1 lec.

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 lec.

Basic queueing models. Design and control of queueing systems. Statistical inference from queueing processes. Solution techniques (including simulation). Scheduling and equipment maintenance. Highway and urban traffic networks. Analysis of computer systems.

562 Inventory Theory Fall. 4 credits. Prerequisite: OR&IE 320 and 361. 3 lec, 1 rec.

Discussion of the nature of inventory systems and their design and control. Periodic and continuous review policies for single-term and single-location problems. Multi-item and multi-echelon extensions. Dynamic and static models are discussed. Redistribution methods are analyzed. Applications are stressed.

563 Applied Time Series Analysis Spring. 3 credits. Prerequisite: OR&IE 361, Computer Science 211, or permission of instructor. 2 lec, 1 rec; final project.

Box-Jenkins models, which are versatile, widely used, and applicable to nonstationary and seasonal time series, are covered in detail. The various stages of model identification, estimation, diagnostic checking, and forecasting are treated. Long-range dependence models and the related statistics are considered. As time permits, other topics such as spectral analysis, filtering, the sampling and aliasing problem, and the fast Fourier transform algorithm are discussed. Applications to economics and hydrology are emphasized. Assignments require computer work.

570 Statistical Methods in Quality and Reliability Control Spring. 3 credits. Prerequisite: OR&IE 370 or equivalent. 3 lec.

Control concepts and methods for attributes and variables; process capability analysis; acceptance sampling plans; elementary procedures for variables; acceptance-rectification procedures. Reliability concepts; exponential and normal distributions in reliability; life and reliability analysis of components and systems; redundancy.

580 Digital Systems Simulation Fall. 4 credits. Prerequisites: Computer Science 211 and OR&IE 370 or permission of instructor. 2 lec, 1 rec.

Digital computer programs to simulate the operation of complex discrete systems in time. Modeling, program organization, random number and deviate generation, simulation languages, statistical considerations; applications to a variety of problem areas.

599 Project Fall and spring. 5 credits. For M.Eng. students. Identification, analysis, design, and evaluation of feasible solutions to some applied problem within the OR&IE field. A formal report and oral defense of the approach and solution are required.

[614 Facilities Location and Design Spring. 3 credits. Prerequisite: OR&IE 320 or 622 or permission of instructor. Not offered 1981–82. 3 lec-recs.

Formulation, analysis, and solution techniques for location and facility design problems. Applications in industrial environmental and regional areas.]

622 Operations Research I Fall. 3 credits. Not open to students who have had OR&IE 320. 3 lec-recs.

Survey of deterministic models. Models are drawn from linear, mixed-integer, nonlinear, and dynamic programming. Network theory, game theory, and deterministic inventory models. Modeling and applications are stressed.

623 Operations Research II Spring. 3 credits. Not open to students who have had OR&IE 361. Prerequisite: OR&IE 260 or 270 or permission of instructor. 3 lec-recs.

Models of inventory and production control. Markov decision models, queueing theory and its applications. Simulation. Illustrative examples and problems.

625 Scheduling Theory Fall. 3 credits. Prerequisite: permission of instructor. 3 lec-recs.

Scheduling and sequencing problems. Single resource scheduling, parallel processing, flow shop scheduling. Methodology is drawn from dynamic and integer programming; simulation techniques and heuristic methods.

626 Advanced Production and Inventory Planning Spring. 3 credits. 3 lec.

Introduction to a variety of production and distribution planning problems; the development of mathematical models corresponding to these problems; a study of approaches for finding solutions.

630–631 Mathematical Programming I and II 630, fall; 631, spring. 3 credits each term. Prerequisite: advanced calculus. 3 lec.

A rigorous treatment of the theory and computational techniques of linear programming and its extensions. Formulation, duality theory, simplex, and dual simplex methods. Sensitivity analysis. Network flow problems and algorithms. Theory of polyhedral convex sets, systems of linear equations and inequalities, Farkas' Lemma. Exploiting special structure in the simplex method, computational implementation. Decomposition Principle. Introduction to integer and nonlinear programming and game theory.

632 Nonlinear Programming Fall. 3 credits. Prerequisite: OR&IE 630. 3 lec.

Necessary and sufficient conditions for unconstrained and constrained optima. Computational methods, including interior (e.g., penalty functions), boundary (e.g., gradient projection), and exterior (e.g., cutting plane) approaches.

[635 Game Theory I Fall. 3 credits. Prerequisite: Mathematics 411 or permission of instructor. Not offered 1981–82. 3 lec.

The minimax theorem for two-person zero-sum games. Two-person general sum games and noncooperative n -person games; Nash equilibrium points. Cooperative n -person games; the core, stable sets, Shapley value, bargaining set, kernel, nucleolus.]

[637 Dynamic Programming Spring. 3 credits. Prerequisite: concurrent registration in OR&IE 660 and Mathematics 411 or equivalent. Not offered 1981–82. 3 lec.

Optimization of sequential decision processes. Deterministic and stochastic models, infinite horizon Markov decision models, policy iterations. Contraction mapping methods. Applications drawn from inventory theory, production control; discrete combination examples.]

[639 Convex Analysis Fall. 3 credits. Prerequisite: Mathematics 411 and 431 or permission of instructor. Not offered 1981–82. 3 lec.

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.]

641 Integer Programming Spring. 3 credits. Prerequisite: OR&IE 630. 3 lec.

Discrete optimization. Linear programming in which the variables are restricted to be integer-valued. Theory, algorithms, and applications. Cutting plane methods, enumerative methods, and group theoretic methods; additional topics are drawn from recent research in this area.

643 Graph Theory and Network Flows Fall. 3 credits. Prerequisite: permission of instructor. 3 lec.

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.

[644 Combinatorial Optimization Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1981–82. 3 lec.

Topics in combinatorics, graphs, and networks. These include matching, matroids, polyhedral combinatorics, and optimization algorithms.]

660 Applied Probability Fall. 4 credits. Prerequisite: advanced calculus. 3 lec, 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 lec, 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.

670 Applied Statistics Spring. 4 credits. Prerequisite: OR&IE 660 or equivalent. 3 lec, 1 rec.

Review of distribution theory of special interest in statistics: normal, chi-square, binomial, Poisson, t , and F ; introduction to statistical decision theory; sufficient statistics; theory of minimum variance unbiased point estimation; maximum likelihood and Bayes estimation; basic principles of hypothesis testing, including Neyman-Pearson lemma and likelihood ratio principle; confidence interval construction.

671 Intermediate Applied Statistics Fall. 4 credits. Prerequisite: OR&IE 670 or equivalent. 3 lec, 1 rec.

Statistical inference based on the general linear model; least squares estimators and their optimality properties; likelihood ratio tests and corresponding confidence regions; simultaneous inference. Applications in regression analysis and ANOVA models. Variance components and mixed models. Correlation, ridge regression. Use of the computer as a tool for statistics is stressed.

[672 Statistical Decision Theory Fall. 3 credits. Prerequisite: OR&IE 471 or 670 or equivalent. Not offered 1981–82. 3 lec.

The general problem of statistical decision theory and its applications. Comparison of decision rules; Bayes, admissible, and minimax rules. Problems involving sequences of decisions over time. Use of the sample cdf and other simple nonparametric methods. Applications.]

673 Nonparametric Statistical Analysis Spring. 3 credits. Prerequisite: OR&IE 670 or permission of instructor.

3 lecs.
Estimation of quantiles, cdf's and pdf's. Properties of order statistics and rank-order statistics. Hypothesis testing in one- and several-sample situations; sign tests; use of ranks for tests and estimation. Small and large sample properties of tests. Asymptotic distributions of test statistics. Testing goodness of fit.

[674 Design of Experiments] Spring. 4 credits. Prerequisite: OR&IE 671 or permission of instructor. Not offered 1981-82.

3 lecs.
Use and analysis of experimental designs such as randomized blocks and Latin squares; analysis of variance and covariance, factorial experiments; statistical problems associated with finding best operating conditions; response-surface analysis.]

[675 Qualitative Data Analysis] Spring. 3 credits. Prerequisite: OR&IE 671. Not offered 1981-82. Varieties of categorical data; cross classifications and contingency tables; tests for independence; multidimensional tables and log-linear models; maximum likelihood and weighted least squares estimation; tests of goodness of fit; analysis of incomplete tables; life tables; paired comparison experiments.]

[676 Statistical Analysis of Life Data] Fall. 3 credits. Prerequisite: OR&IE 671 or equivalent. Not offered 1981-82. Analysis of data from reliability, fatigue, and life-testing studies in engineering; also biomedical applications. Survival distributions, hazard rate, censoring. Life tables. Estimation and hypothesis testing. Standards. Goodness of fit, hazard plotting. Covariance analysis, accelerated life testing. Multiple decrement models, competing risks. Sample size determination. Adaptive sampling.]

729 Selected Topics in Applied Operations Research Fall or spring. Credit to be arranged. Current research topics dealing with applications of operations research.

[736 Game Theory II] Spring. 3 credits. Prerequisite: OR&IE 635. Not offered 1981-82.

3 lecs.
A continuation of OR&IE 635, 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.]

738 Selected Topics in Game Theory Fall or spring. Credit to be arranged. Current research topics in game theory.

739 Selected Topics in Mathematical Programming Fall or spring. Credit to be arranged. Current research topics in mathematical programming.

[752 Advanced Inventory Control] Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1981-82.

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.]

761 Advanced Queueing Theory Fall. 3 credits. Prerequisite: OR&IE 660 or equivalent.

3 lecs.
A study of stochastic processes arising in a class of problems including congestion, storage, dams, and insurance. The treatment is self-contained. Transient behavior of the processes is emphasized. Heavy traffic situations are investigated.

[762 Advanced Stochastic Processes] Fall. 3 credits. Prerequisite: OR&IE 661 or equivalent. Not offered 1981-82.

3 lecs.
A selection of topics from the following: stationary processes, Levy processes, diffusion processes, point processes, martingales, regenerative phenomena, stochastic calculus, weak convergence.]

[764 Deterministic and Stochastic Control]

Spring. 3 credits. Prerequisite: OR&IE 661 or equivalent. Not offered 1981-82.

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 phenomena, storage models, and environmental management are discussed.]

769 Selected Topics in Applied Probability Fall or spring. Credit to be arranged. Topics are chosen from current literature and research areas of the staff.

773 Statistical Selection and Ranking Procedures Fall. 3 credits. Prerequisite: OR&IE 674 or permission of instructor.

3 lecs.
A study of multiple-decision problems in which a choice must be made among two or more courses of action. Major emphasis is on selection and ranking problems involving choosing the "best" category where goodness is measured in terms of a particular parameter of interest. Statistical formulations of such problems; indifference-zone, subset, and other approaches. Single-stage, two-stage, and sequential procedures. Applications. Recent developments.

779 Selected Topics in Applied Statistics Fall or spring. Credit to be arranged. Topics chosen from current literature and research interests of the staff.

790 Special Investigations Fall or spring. Credit to be arranged. For individuals or small groups. Study of special topics or problems.

799 Thesis Research Fall or spring. Credit to be arranged. For individuals doing thesis research for master's or doctoral degrees.

891 Operations Research Graduate Colloquium Fall or 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.

Structural Engineering Courses

See Civil and Environmental Engineering Courses.

Theoretical and Applied Mechanics Courses

Basics in Engineering Mathematics and Mechanics

202 Mechanics of Solids (also Engr 202) Fall or spring. 3 credits. Prerequisite: coregistration in Mathematics 293.

2 lecs, 1 rec, 4 labs each semester; evening exams.
See description under Engineering Basic Studies.

203 Dynamics (also Engr 203) Fall or spring. 3 credits. Prerequisites: coregistration in Mathematics 294.

2 lecs, 1 rec, 4 labs each semester; evening exams.
See description under Engineering Basic Studies.

293 Engineering Mathematics (also Mathematics 293) Fall or spring. 3 credits. Prerequisite: Mathematics 192 or 194.

Evening exams (see Mathematics 293). Infinite series, complex numbers, first and second order ordinary differential equations with applications in the physical and engineering sciences.

294 Engineering Mathematics (also Mathematics 294) Fall and spring. 4 credits. Prerequisite: Mathematics 293.

Evening exams (see Mathematics 294). Vector spaces and linear algebra, matrices, eigenvalue problems and applications to systems of linear differential equations. Vector calculus. Boundary value problems and introduction to Fourier series.

Engineering Mathematics

310 Advanced Engineering Analysis I Fall and spring. 3 credits. Prerequisite: Mathematics 294 or equivalent.

3 lecs.
Ordinary differential equations as applied in engineering context. Analytical and numerical methods. Special functions, initial value, boundary value and eigenvalue problems in linear partial differential equations, introduction to nonlinear ordinary differential equations.

311 Advanced Engineering Analysis II Spring. 3 credits. Prerequisite: T&AM 310 or equivalent. Functions of several variables, introduction to complex variables, analytic functions, conformal mapping, method of residues. Application to the solution of Laplace's equation, and transform inversion techniques. Examples drawn from fluid mechanics, heat transfer, electromagnetics, and elasticity.

610 Methods of Applied Mathematics I Fall. 3 credits. Intended for beginning graduate students in engineering and science who have a heterogeneous mathematical background. 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. Not offered 1981-82. In context of applications: Hilbert-Schmidt and Fredholm theories of integral equations, Wiener-Hopf equations with application to finite interval, Carleman equation and its generalization, effective approximations.]

Experimental Mechanics

640 Experimental Mechanics Fall. 3 credits. 1 lec.

Each student is expected to perform six to ten experiments in mechanics, selected to meet his or her individual interests. Topics: elastic, viscoelastic, microplastic, and plastic response of materials; linear and nonlinear vibration of discrete and continuous systems; acoustic and elastic wave propagation and scattering phenomena; dynamical stability of rigid bodies; analog and digital simulation of dynamical systems; magnetoelastic interactions; signal processing.

Continuum Mechanics and Inelasticity

[450 Introduction to Continuum Mechanics Fall. Offered alternate years. 3 credits. Not offered 1981-82.

Provides a foundation for further studies in fluid and solid mechanics, materials science, and other branches of engineering. Vector and tensor analysis; kinematics of deformation; analysis of stress and strains; balance laws of physics; constitutive equations; examples of elasticity and fluid mechanics.]

651 Continuum Mechanics and Thermodynamics Fall. 3 credits. Offered alternate years.

Kinematics; conservation laws; the entropy inequality; constitutive equations; frame indifference; material symmetry. Simple materials and the position of classical theories in the framework of modern continuum mechanics.

752 Topics in Continuum Mechanics Spring. 3 credits. Prerequisite: T&AM 651. Offered alternate years.

Theory of (nonlinear) elasticity and thermoelasticity; universal solutions, wave propagations, and stability

theory. Nonlinear viscoelastic fluids and solids. Viscometric flows. Materials with continuum microstructure.

[754 Analytical Methods in Continuum Mechanics Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1981-82. Tensor analysis with applications to shell theory, incompatibility, and finite elasticity. Calculus of variations. Group theoretical methods in solid and fluid mechanics. Noether's theorem. Conservation laws.]

757 Viscoelasticity and Creep Fall. 3 credits. Offered alternate years.

Linear viscoelasticity: constitutive equations, models, differential and integral operators, Laplace transforms, complex modulus, vibrations and wave propagation, boundary value problems. Thermoviscoelasticity. Creep: classical and modern theories, stress redistribution, boundary value problems.

[758 Theory of Plasticity Fall. Offered alternate years. 3 credits. Not offered 1981-82. Plastic stress-strain laws, yield criteria, flow rules. Work hardening. Flexure and torsion of bars. Boundary-value problems — thick cylinders, spheres, discs, general 3-D. Residual stress. Limit analysis of structures. Plane strain — slip line theory.]

Elasticity and Waves

574 Mechanical Vibrations and Waves Spring. 3 credits.

Two 1½-hour lecs; 4 labs each semester. Review of vibrations of discrete systems, including multi-degree-of-freedom vibrations, forced oscillations, determination of natural modes and frequencies. 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 Electrical Engineering 690) Spring. 3 credits.

3 lecs, biweekly labs. Introduction to the principles and theories of acoustics. The vibrations of strings, bars, membranes, and plates; plane and spherical acoustic waves; transmission phenomena; resonators and filters; waves in solids and fluids. Application is made to sonic and ultrasonic transducers, music and noise, and architectural acoustics, and an introduction is given to the digital processing of acoustic signals. At the level of *Fundamentals of Acoustics* by Kinster and Frey.

765 Mathematical Theory of Elasticity Spring. Offered alternate years. 3 credits. Prerequisite: T&AM 664.

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 1981-82.

Two 1½-hour lecs. An advanced course on dynamic stress analysis and wave propagation in elastic solids. Theory of elastodynamics. Waves in isotropic and anisotropic media. Reflection and refraction. Surface waves and waves in layered media. Transient waves and methods of Lamb-Cagniard-Pekeris. Thick plate theories. Vibration of spheres. Scattering of waves and dynamic stress concentration.]

Dynamics and Space Mechanics

570 Intermediate Dynamics Fall. 3 credits.

Two 1¼-hour lecs. Newtonian mechanics for single particles and systems of particles, conservation laws, central-force motion; special relativity; Eulerian mechanics for rigid bodies, tops, gyroscopes; generalized coordinates, D'Alembert's principle, Lagrangian equations, analytic mechanics for particles and rigid bodies.

[671 Advanced Dynamics Fall. 3 credits.

Prerequisite: T&AM 670 or equivalent. Offered alternate years. Not offered 1981-82. Review of Lagrangian mechanics; Hamilton's principle, the principle of least action, and related topics from the calculus of variations; Hamilton's canonical equations; approximate methods for two-degrees-of-freedom systems (Birkhoff's transformation); canonical transformations and Hamilton-Jacobi theory; Poisson stability and related topics from topological dynamics; Hamilton's principle for continuous systems, applications to shell dynamics.]

672 Celestial Mechanics (also Astronomy 579)

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) Spring. 3 credits. Prerequisite: an undergraduate course in dynamics. Offered alternate years. Not offered 1981-82.

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 667 or equivalent. Offered alternate years. Review of linear systems, free and forced vibrations. Nonlinear systems, phase plane methods, method of isoclines. Conservative systems. General autonomous systems, equilibrium and periodic solutions, linearization and Lyapunov stability criteria, Poincaré-Bendixson theorem, indices. Quantitative analysis of weakly nonlinear systems in free and forced vibrations, perturbation methods, Krylov-Bogoliubov method. Applications to problems in mechanics.

776 Qualitative Theory of Dynamical Systems

Spring. 3 credits. Prerequisite: T&AM 775 or equivalent. Offered alternate years.

Review of planar (single degree-of-freedom) systems. The concept of dynamical systems, local and global analysis. N-dimensional systems, types of solutions, Poincaré maps, stability. Structural stability and generic properties, bifurcations in planar systems. 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 three, 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.

798-799 Selected Topics in Theoretical and Applied Mechanics 798, fall; 799, spring. 1-4 credits, as arranged.

Special lectures or seminars on subjects of current interest. Topics are announced when the course is offered.

890-890 Research in Theoretical and Applied Mechanics Fall or spring. 1-6 credits; 890. 1-9 credits; 990: as arranged. Thesis or independent research at the M.S. (890) or Ph.D. (990) level on a subject of theoretical and applied mechanics. Research is under the guidance of a faculty member.

Faculty Roster

- Abel, John F., Ph.D., U. of California at Berkeley. Assoc. Prof., Civil and Environmental Engineering
 Albright, Louis D., Ph.D., Cornell U. Assoc. Prof., Agricultural Engineering
 Ankrum, Paul D., M.S., Cornell U. Prof., Electrical Engineering
 Aspö, Bengt, Ph.D., Stanford U. Asst. Prof., Computer Science
 Ast, Dieter G., Ph.D., Cornell U. Assoc. Prof., Materials Science and Engineering
 Auer, Peter L., Ph.D., California Inst. of Technology. Prof., Mechanical and Aerospace Engineering
 Avedisian, Charles T., Ph.D., Princeton U. Asst. Prof., Theoretical and Applied Mechanics
 Babaoglu, Ozalp, Ph.D., U. of California at Berkeley. Asst. Prof., Computer Science
 Bachman, Steven B., Ph.D., U. of California at Davis. Asst. Prof., Geological Sciences
 Ballantyne, Joseph M., Ph.D., Massachusetts Inst. of Technology. Prof., Electrical Engineering
 Bartel, Donald L., Ph.D., U. of Iowa. Assoc. Prof., Mechanical and Aerospace Engineering
 Bassett, William A., Ph.D., Columbia U. Prof., Geological Sciences
 Batterman, Boris W., Ph.D., Massachusetts Inst. of Technology. Prof., Applied and Engineering Physics
 Bechhofer, Robert E., Ph.D., Columbia U. Prof., Operations Research and Industrial Engineering
 Berger, Toby, Ph.D., Harvard U. Prof., Electrical Engineering
 Billera, Louis J., Ph.D., City U. of New York. Prof., Operations Research and Industrial Engineering
 Bird, John M., Ph.D., Rensselaer Polytechnic Inst. Prof., Geological Sciences
 Bisogni, James J., Ph.D., Cornell U. Assoc. Prof., Civil and Environmental Engineering
 Black, Richard D., Ph.D., U. of Illinois. Assoc. Prof., Agricultural Engineering
 Blakely, John M., Ph.D., Glasgow U. 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
 Bloom, Jeremy A., Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Operations Research and Industrial Engineering
 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. Asst. 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. Assoc. Prof., Applied and Engineering Physics
 Burns, Joseph A., Ph.D., Cornell U. Prof., Theoretical and Applied Mechanics
 Burstein, Albert H., Ph.D., New York U. Assoc. Prof., Mechanical and Aerospace Engineering
 Burton, Malcolm S., S.M., Massachusetts Inst. of Technology. Prof., Materials Science and Engineering
 Cady, K. Bingham, Ph.D., Massachusetts Inst. of Tech. Assoc. Prof., Nuclear Science and Engineering
 Capranica, Robert R., Sc.D., Massachusetts Inst. of Technology. Prof., Biophysics/Electrical Engineering
 Carlin, Herbert J., D.E.E., Polytechnic Inst. of Brooklyn. J. Preston Lewis Professor of Engineering, Electrical Engineering
 Carter, C. B., Ph.D., Oxford U. Asst. Prof., Materials Science and Engineering
 Caughey, David A., Ph.D., Princeton U. Assoc. Prof., Mechanical and Aerospace Engineering
 Cisne, John L., Ph.D., U. of Chicago. Assoc. Prof., Geological Sciences
 Clark, David D., Ph.D., U. of California at Berkeley. Prof., Nuclear Science and Engineering
 Clayton, Roderick K., Ph.D., California Inst. of Technology. Prof., Biological Sciences/Biophysics
 Cocchetto, Joseph F., Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Chemical Engineering
 Cocks, George G., Ph.D., Cornell U. Assoc. Prof., Chemical Engineering
 Cohen, Claude, Ph.D., Princeton U. Assoc. Prof., Chemical Engineering
 Coleman, Thomas F., Ph.D., U. of Waterloo. Asst. Prof., Computer Science
 Constable, Robert L., Ph.D., U. of Wisconsin. Prof., Computer Science
 Conta, Bartholemew J., M.S., Cornell U. Prof., Mechanical and Aerospace Engineering
 Conway, Harry D., Sc.D., Cambridge U. Prof., Theoretical and Applied Mechanics
 Conway, Richard W., Ph.D., Cornell U. Prof., Computer Science
 Cooke, J. Robert, Ph.D., North Carolina State U. Prof., Agricultural Engineering
 Cool, Terrill A., Ph.D., California Inst. of Technology. Prof., Applied and Engineering Physics
 Dalman, G. Conrad, D.E.E., Polytechnic Inst. of Brooklyn. Prof., Electrical Engineering
 Dashner, Peter A., Ph.D., SUNY at Buffalo. Asst. Prof., Theoretical and Applied Mechanics
 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. Asst. Prof., Computer Science
 Dick, Richard I., Ph.D., U. of Illinois. Joseph P. Ripley Professor of Engineering, Civil and Environmental Engineering
 Donahue, James E., Ph.D., U. of Toronto. Asst. Prof., Computer Science
 Dworsky, Leonard B., Ph.D., U. of Michigan. Prof., Civil and Environmental Engineering
 Eastman, Lester F., Ph.D., Cornell U. Prof., Electrical Engineering
 Erickson, William H., M.S., Carnegie Inst. of Technology. Prof., Electrical Engineering
 Everhart, Thomas E., Ph.D., Cambridge 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., Doctorate, Munich Technical U. 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
 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. Asst. Prof., Civil and Environmental Engineering
 Gouldin, Frederick C., Ph.D., Princeton U. Assoc. Prof., Mechanical and Aerospace Engineering
 Gries, David J., Ph.D., München Technische Hochschule. 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. Asst. Prof., Materials Science and Engineering
 Gubbins, Keith E., Ph.D., U. of London. Thomas R. Briggs Professor of Engineering, Chemical Engineering
 Gunkel, Wesley W., Ph.D., Michigan State U. Prof., Agricultural Engineering
 Haith, Douglas A., Ph.D., Cornell U. Assoc. Prof., Agricultural Engineering
 Hammer, David A., Ph.D., Cornell U. Assoc. Prof., Nuclear Science and Engineering
 Harriott, Peter, Sc.D., Massachusetts Inst. of Technology. Fred H. Rhodes Professor of Chemical Engineering
 Hart, Edward W., Ph.D., U. of California at Berkeley. Prof., Theoretical and Applied Mechanics/Materials Science and Engineering
 Hartman, Paul L., Ph.D., Cornell U. Prof., Applied and Engineering Physics
 Hartmanis, Juris, Ph.D., California Inst. of Technology. Walter R. Read Prof. 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
 Heetderks, William J., Ph.D., U. of Michigan. Asst. Prof., Electrical Engineering
 Holmes, Philip J., Ph.D., Southampton U. Assoc. Prof., Theoretical and Applied Mechanics
 Hopcroft, John E., Ph.D., Stanford U. Prof., Computer Science
 Hui, Chung Y., Ph.D., Harvard U. Asst. Prof., Theoretical and Applied Mechanics
 Ingraffea, Anthony R., Ph.D., U. of Colorado. Asst. Prof., Civil and Environmental Engineering
 Irwin, Lynne H., Ph.D., Texas A & M U. Assoc. Prof., Agricultural Engineering
 Isaacson, Michael S., Ph.D., U. of Chicago. Assoc. Prof., Applied and Engineering Physics
 Isacks, Bryan L., Ph.D., Columbia U. Prof., Geological Sciences
 Ishibashi, Isao, Ph.D., U. of Washington. Assoc. Prof., Civil and Environmental Engineering
 Jackson, Peter L., Ph.D., Stanford U. Asst. Prof., Operations Research and Industrial Engineering
 Jenkins, James T., Ph.D., Johns Hopkins U. Assoc. Prof., Theoretical and Applied Mechanics
 Jewell, William J., Ph.D., Stanford U. Assoc. Prof., Agricultural Engineering
 Jirka, Gerhard H., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Civil and Environmental Engineering

- Johnson, Herbert H., Ph.D., Case Inst. of Technology. Prof., Materials Science and Engineering
- Karig, Daniel E., Ph.D., U. of California at San Diego. Prof., Geological Sciences
- 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. Assoc. Prof., Electrical Engineering
- Kim, Myunghwan, Ph.D., Yale U. Prof., Electrical Engineering
- Kohlstedt, David, Ph.D., U. of Illinois. Assoc. 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
- 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. Assoc. 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. Assoc. 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
- Levine, Gilbert, Ph.D., Cornell U. Prof., Agricultural Engineering
- Lewis, Aaron, Ph.D., Case Western Reserve U. Assoc. Prof., Applied and Engineering Physics
- Li, Che-Yu, Ph.D., Cornell U. Prof., Materials Science and Engineering
- Liang, Ta, Ph.D., Cornell U. Prof., Civil and Environmental Engineering
- Liboff, Richard L., Ph.D., New York U. Prof., Electrical Engineering
- Liggett, James A., Ph.D., Stanford U. Prof., Civil and Environmental Engineering
- Linke, Simpson, M.E.E., Cornell U. Prof., Electrical Engineering
- Lion, Leonard W., Ph.D., Stanford U. Asst. Prof., Civil and Environmental Engineering
- Liu, Philip L.-F., Sc.D., Massachusetts Inst. of Technology. Assoc. Prof., Civil and Environmental Engineering
- Loehr, Raymond C., Ph.D., U. of Wisconsin. Prof., Agricultural Engineering
- Lorenzen, Robert T., M.S., U. of California at Davis. Assoc. Prof., Agricultural Engineering
- Loucks, Daniel P., Ph.D., Cornell U. Prof., Civil and Environmental Engineering
- Lovelace, Richard V. E., Ph.D., Cornell U. Assoc. Prof., Applied and Engineering Physics
- Lucas, William F., Ph.D., U. of Michigan. Prof., Operations Research and Industrial Engineering
- Ludford, Geoffrey S. S., Sc.D., Cambridge U. Prof., Theoretical and Applied Mechanics
- Ludington, David C., Ph.D., Purdue U. Assoc. Prof., Agricultural Engineering
- Luk, Franklin T.-C., Ph.D., Stanford U. Asst. Prof., Computer Science
- Lumley, John L., Ph.D., Johns Hopkins U. Willis H. Carrier Professor of Engineering, Mechanical and Aerospace Engineering
- Lynn, Walter R., Ph.D., Northwestern U. Prof., Civil and Environmental Engineering
- Lyon, George B., M.S., U. of Iowa. Assoc. Prof., Civil and Environmental Engineering
- McGaughan, Henry S., M.E.E., Cornell U. 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, Armin H., Ph.D., Northwestern U. Prof., Civil and Environmental Engineering
- Millier, William F., Ph.D., Cornell U. Prof., Agricultural Engineering
- 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. Prof., Electrical Engineering
- Nelkin, Mark S., Ph.D., Cornell U. Prof., Applied and Engineering Physics
- Nemhauser, George L., Ph.D., Northwestern U. Prof., Operations Research and Industrial Engineering
- Nichols, Benjamin, Ph.D., U. of Alaska. Prof., Electrical Engineering
- Nilson, Arthur H., Ph.D., U. of California at Berkeley. Prof., Civil and Environmental Engineering
- Olbricht, William L., Ph.D., California Inst. of Technology. Asst. Prof., Chemical Engineering
- Oliver, Jack E., Ph.D., Columbia U. Irving Porter Church Professor of Engineering, Geological Sciences
- Oloff, Neil, J.D., Columbia U. Assoc. Prof., Civil and Environmental Engineering/STS
- O'Rourke, Thomas D., Ph.D., U. of Illinois. Asst. Prof., Civil and Environmental Engineering
- Pao, Yih-Hsing, Ph.D., Columbia U. Prof., Theoretical and Applied Mechanics
- Peköz, Teoman, Ph.D., Cornell U. Assoc. Prof., Civil and Environmental Engineering
- Phelan, Richard M., M.E.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
- 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. Prof., Operations Research and Industrial Engineering
- Pritchard, Paul A., Ph.D., Australian National University. Asst. Prof., Computer Science
- Raj, Rishi, Ph.D., Harvard U. Assoc. Prof., Materials Science and Engineering
- Rand, Richard H., Sc.D., Columbia U. Prof., Theoretical and Applied Mechanics
- Rehkgugler, 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. Prof., Geological Sciences
- Rhodin, Thor N., Ph.D., Princeton U. Prof., Applied and Engineering Physics
- Rodriguez, Ferdinand, Ph.D., Cornell U. Prof., Chemical Engineering
- Ruina, Andy L., Ph.D., Brown U. Asst. Prof., Theoretical and Applied Mechanics
- Rosson, Joseph L., M.E.E., Cornell U. Prof., Electrical Engineering
- Ruoff, Arthur L., Ph.D., U. of Utah. Class of 1912 Professor, Materials Science and Engineering
- Sachse, Wolfgang H., Ph.D., Johns Hopkins U. Assoc. Prof., Theoretical and Applied Mechanics
- Salton, Gerard, Ph.D., Harvard U. Prof., Computer Science
- Santner, Thomas J., Ph.D., Purdue U. Assoc. Prof., Operations Research and Industrial Engineering
- Sass, Stephen L., Ph.D., Northwestern U. Prof., Materials Science and Engineering
- Scheele, George F., Ph.D., U. of Illinois. Assoc. Prof., Chemical Engineering
- Scott, Norman R., Ph.D., Cornell U. Prof., Agricultural Engineering
- Schneider, Fred B., Ph.D., SUNY at Stony Brook. Asst. Prof., Computer Science
- Schruben, Lee W., Ph.D., Yale U. Asst. Prof., Operations Research and Industrial Engineering
- Schuler, Richard E., Ph.D., Brown U. Assoc. Prof., Civil and Environmental Engineering Economics
- 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, Ph.D., U. of Southern California. Assoc. Prof., Civil and Environmental Engineering
- Shuler, Michael L., Ph.D., U. of Minnesota. Assoc. Prof., Chemical Engineering
- Siegel, Benjamin M., Ph.D., Massachusetts Inst. of Technology. Prof., Applied and Engineering Physics
- Silcox, John, Ph.D., Cambridge U. 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, Jerry R., Ph.D., Harvard U. Asst. Prof., Civil and Environmental Engineering
- Streett, William B., Ph.D., U. of Michigan. Prof., Chemical Engineering
- Sudan, Ravindra N., Ph.D., U. of London. I.B.M. Professor of Engineering, Electrical Engineering
- Tang, Chung L., Ph.D., Harvard U. Prof., Electrical Engineering
- Taqqi, Murad S., Ph.D., Columbia U. Assoc. Prof., Operations Research and Industrial Engineering
- Taylor, Dean L., Ph.D., Stanford U. Asst. Prof., Mechanical and Aerospace Engineering
- Taylor, Howard M., 3d, Ph.D., Stanford U. Prof., Operations Research and Industrial Engineering
- Thomas, Robert J., Ph.D., Wayne State U. Assoc. Prof., Electrical Engineering
- Thorp, James S., Ph.D., Cornell U. Prof., Electrical Engineering
- Thorpe, Raymond G., M.Ch.E., Cornell U. Assoc. Prof., Chemical Engineering
- Todd, Michael J., Ph.D., Yale U. Assoc. Prof., Operations Research and Industrial Engineering
- Tong, 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
- Trotter, Leslie E., Ph.D., Cornell U. Assoc. Prof., Operations Research and Industrial Engineering
- Turcotte, Donald L., Ph.D., California Inst. of Technology. Prof., Geological Sciences
- Turnbull, Bruce W., Ph.D., Cornell U. Assoc. Prof., Operations Research and Industrial Engineering
- Turnquist, Mark A., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Civil and Environmental Engineering
- Van Loan, Charles F., Ph.D., U. of Michigan. Assoc. Prof., Computer Science
- Von Berg, Robert L., Sc.D., Massachusetts Inst. of Technology. Prof., Chemical Engineering
- Vrana, Norman M., M.E.E., Cornell U. Prof., Electrical Engineering

Walrand, Jean C., Ph.D., University of California at Berkeley. Asst. Prof., Electrical Engineering
Walter, Michael F., Ph.D., U. of Wisconsin. Asst. Prof., Agricultural Engineering
Wang, Kuo-King, Ph.D., U. of Wisconsin. Prof., Mechanical and Aerospace Engineering
Warhaft, Zellman, Ph.D., U. of London. Asst. 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
Zeman, Otto, Ph.D., Pennsylvania State U., Asst. Prof., Mechanical and Aerospace Engineering

Graduate School

Administration

Alison P. Casarett, dean
John F. Wootten, associate dean
Benjamin P. Bowser, assistant dean
Richard Lance, secretary of the graduate faculty

Graduate study at Cornell is pursued through the Graduate School, which administers the many graduate fields of study, and through the various graduate professional schools and colleges.

Programs leading to the degrees of Doctor of Law (J.D.), Doctor of Medicine (M.D.), Doctor of Veterinary Medicine (D.V.M.), Master of Business Administration (M.B.A.), Master of Public Administration (M.P.A.), and Master of Professional Studies in Hospital and Health Services Administration (M.P.S.(H.H.S.A.)) are not administered by the Graduate School. Information on those programs can be obtained from the Law School, the Medical College (New York City), the College of Veterinary Medicine, and the Graduate School of Business and Public Administration, respectively.

Graduate School

The graduate program at Cornell permits an unusual degree of accommodation to the needs and interests of the individual student. Degree requirements are kept to a minimum. There are no specific course or credit requirements for the advanced general degrees of Master of Arts, Master of Science, and Doctor of Philosophy but only such general requirements that best accomplish the aim of graduate study: a period of study in residence, the mastery of one subject, adequate knowledge of allied subjects, oral examinations to establish competency for presentation of a thesis, and a satisfactory thesis. Certain advanced professional degree programs have specific course or credit requirements; these are announced by the faculty of the professional school or college in which the degrees are offered.

A close working relationship with faculty members is essential to the graduate program at Cornell. Under the Special Committee system, the student is guided by and works with at least two or three faculty members, chosen by the student to represent his or her major and minor subjects. The major subject representative is the chairperson of the Special Committee and usually has the primary responsibility for directing the student's thesis research.

Students who want to use the University's facilities for intensive specialized training only, and who do not want to become degree candidates, may apply for admission as nondegree candidates.

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 which 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 the *Guide to Graduate Study*. Both publications are available from the Graduate School, Cornell University, Sage Graduate Center, Ithaca, New York 14853.

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 which require the GRE.

School of Hotel Administration

Administration

John J. Clark, Jr., dean
 Normand L. Peckenpaugh, assistant dean for administration
 Stanley W. Davis, graduate faculty representative
 Cheryl S. Farrell, director of admissions
 Harry R. Keller, director of placement and alumni affairs
 Joan S. Livingston, executive editor, *The Cornell Hotel and Restaurant Administration Quarterly*
 Mary Milks, registrar
 Malcolm A. Noden, director of financial aid
 Margaret J. Oaksford, librarian

Degree Program

Hotel and Restaurant Administration

Degree
 B.S.

Facilities

Statler Hall is a unique educational building designed expressly to meet the needs of the faculty and students of the School of Hotel Administration. The building has three parts: a classroom section, a practice inn, and an auditorium with full stage facilities. The five-story classroom section is supplemented by office, classroom, and laboratory space in the Alice Statler Auditorium wing. These two sections comprise lecture rooms, auditoriums, laboratories, and offices for instruction and research in hotel administration.

The Howard B. Meek Library provides an extensive collection of publications on hotel and restaurant operation and related subjects. The library has received many gifts of display materials and personal collections — among them the Herndon and Vehling collections.

Statler Inn, the school's practice laboratory, contains fifty-two guest rooms, including two suites, a fully equipped front office, and lounge areas. The Inn also has a variety of restaurants seating a total of 1,000 people: a formal dining room for 200, five private dining rooms for 8 to 100, two self-service restaurants for 150 and 200, a cocktail lounge, and a ballroom for 400.

The Inn's facilities provide a realistic laboratory for student instruction in operational procedures and managerial responsibilities for 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 their places 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, in 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 Stanley W. Davis, the school's graduate faculty 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 85 of the 122 credits needed for graduation. From the hotel electives, some combination of courses totaling at least 13 credits is to be taken. The remaining 24 credits may be earned in courses chosen at will from the offerings of any college of the University provided that the customary requirements for admission to the courses chosen are met.

Students in the School of Hotel Administration who plan to attend summer school at Cornell or elsewhere or who propose to attend any other university, with the expectation that the credit earned will be counted toward the Cornell degree in hotel administration, must obtain the approval of the school in advance. Without advance approval, such credit will not count toward the degree.

*Students transferring from other colleges and universities may be allowed appropriate credit against the residence requirement at the time of admission. In addition, in individual exceptional cases, the faculty may elect to modify the residence requirement.

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 on a "satisfactory-unsatisfactory" (S-U) basis. This provision is exclusive of any hotel administration courses offered only on an S-U basis such as H Adm 101.

Students whose term average is at least 3.3 and is 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 elect 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 requirements 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. Jobs suitable for foreign students are considerably less numerous. Consequently, the foreign student must expect to have some difficulty in getting 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 work-study programs which entail six to eight months of on-the-job managerial instruction and experience. For the details of these programs, see Directed Study on the following pages.

†As set forth in the *Practice Instruction Handbook*, supplied on request from the School of Hotel Administration.

Course Requirements for Graduation

<i>Specifically required courses</i>	<i>Credits</i>
Administrative and general management: Hotel Administration 101	1
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
Total specifically required credits	85
Hotel electives	13
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 revised and expanded. In some cases, the numbers of old and new courses overlap. Students are reminded that the most accurate information regarding course offerings 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 15 to 17 credits each semester, selected from the following courses.

<i>Specifically required courses</i>	<i>Credits</i>
H Adm 165, Basic Business Writing	3
H Adm 111, Introductory Psychology	3
H Adm 101, Orientation	1
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
	31

Suggested electives*

	<i>Credits</i>
H Adm 102, Lectures in Hotel Management	1
H Adm 161, Typewriting	2

Sophomore Year

<i>Specifically required courses</i>	<i>Credits</i>
H Adm 211, Management of Human Resources	3
H Adm 221, Managerial Accounting	3
H Adm 222, Managerial Accounting in the Hospitality Industry	3
H Adm 231, Meat Science and Management	3
H Adm 233, Food Production Systems: Cafeterias	3
H Adm 281, Macroeconomics	3
H Adm 282, Microeconomics	3
H Adm 251, Property-Management Graphics	3

H Adm 265, Effective Communication	3
H Adm 331, Food Production Systems: Restaurants	3
	30

Suggested electives

	<i>Credits</i>
H Adm 274, Hotel Computing Applications	3
H Adm 223, Front-Office Machine Accounting	1
H Adm 234, Food and Beverage Control	2
H Adm 384, Principles of Marketing	3
H Adm 261, Report Typing	2

Junior Year

<i>Specifically required courses</i>	<i>Credits</i>
H Adm 341, Law of Business I	3
H Adm 344, Law of Innkeeping	3
H Adm 351-352, Hotel Mechanical and Electrical Problems I and II	6
	12

Suggested electives

	<i>Credits</i>
H Adm 205, Resort and Condominium Management	3
H Adm 305, Rooms-Division Management — Housekeeping and Laundry Operations	2
H Adm 304, Rooms-Division Management — Front Office and Reservations	2
H Adm 314, Psychology in Business and Industry	3
H Adm 381, Advertising and Public Relations	2
H Adm 483, Psychology of Advertising	3
H Adm 322, Investment Management	2
H Adm 323, Financial Analysis and Planning	3
H Adm 326, Introduction to Statistical Analysis and Inference	3
H Adm 204, Franchising in the Hospitality Industry	2
H Adm 284, Tourism	3
H Adm 342, Law of Business II	3
H Adm 306, General Survey of Real Estate	2
H Adm 301, Development of a Hospitality Property	3
H Adm 353, Introductory Food-Facilities Engineering	3
Business and Public Administration NBA 505, Auditing	3

Senior Year

<i>Specifically required courses</i>	<i>Credits</i>
H Adm 451, Physical-Plant Planning and Construction	3

Suggested electives

	<i>Credits</i>
H Adm 382, Cases in Hospitality Marketing	2
H Adm 311, Union-Management Relations in Private Industry	3
H Adm 401, Seminar in Management Principles	2
H Adm 285, Hotel Sales	2
H Adm 406, Integrated Case Studies in the Hospitality Industry	3
H Adm 601-602, Management Intern Program	†
H Adm 421, Internal Control 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	†

Programs in Special Areas

While completing the required courses leading to the bachelor's degree, undergraduates in the school have the option of concentrating their studies in a major area of instruction. These include administration, financial management, food and beverage management, hotel and motel planning and design, management, marketing, and food science, among others.

When the student selects one of these major fields of concentration, he or she should consult the coordinator of instruction in that area during the sophomore year to plan the sequence of elective courses that will best fit his or her program.

A list of elective courses offered in the school's special areas of instruction is provided below.

Undergraduate Elective Courses in Hotel Administration

<i>Administrative and General Management</i>	<i>Credits</i>
H Adm 102, Lectures in Hotel Management	1
H Adm 200, Personal Real Estate Investments	2
H Adm 203, Club Management	2
H Adm 204, Franchising in the Hospitality Industry	2
H Adm 205, Resort and Condominium Management	3
H Adm 206, General Insurance	3
H Adm 301, Development of a Hospitality Property	3
H Adm 302, Principles of Management	3
H Adm 304, Rooms-Division Management — Front Office and Reservations	2
H Adm 305, Rooms-Division Management — Housekeeping and Laundry Operations	2
H Adm 306, General Survey of Real Estate	2
H Adm 307, Hotel Security and Crime Prevention	2
H Adm 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

†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.

*Sixteen credits of hotel electives are to be taken.

H Adm 600, Undergraduate Independent Research in Administrative and General Management	1-3
H Adm 601, Management Intern Program I	6
H Adm 602, Management Intern Program II	6
<i>Human-Resources Management</i>	<i>Credits</i>
H Adm 311, Union-Management Relations in Private Industry: A Survey	3
H Adm 314, Psychology in Business and Industry	3
H Adm 411, Hotel Manpower Management Simulation	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
<i>Accounting and Financial Management</i>	<i>Credits</i>
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 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
<i>Food and Beverage Management</i>	<i>Credits</i>
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 439, T.A. Training in Food and Beverage Management	1-3
H Adm 630, Undergraduate Independent Research in Food and Beverage Management	1-3
<i>Law</i>	<i>Credits</i>
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
<i>Properties Management</i>	<i>Credits</i>
H Adm 353, Introductory Food Facilities Engineering	3
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 459, T.A. Training in Properties Management	1-3
H Adm 650, Undergraduate Independent Research in Properties Management	1-3
<i>Communication</i>	<i>Credits</i>
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
<i>Science and Technology</i>	<i>Credits</i>
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
<i>Economics, Marketing, and Tourism</i>	<i>Credits</i>
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 Modern Languages, Literatures, and Linguistics in the College of Arts and Sciences program description and in the section Advanced Placement of 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, and this committee also approves the thesis.

Candidates for the Master of Professional Studies (M.P.S.) degree pursue one of three 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 qualifying for track II (those who hold Bachelor of Science degrees in hotel administration from an institution other than Cornell) are expected to have taken the courses required for track I as part of their undergraduate work. If they have not done so, these courses should be part of their graduate program. A minimum of three residence units is required to complete track II. Track III is for students who hold a Bachelor of Science degree in hotel administration from Cornell, and normally requires only one year to complete.

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, under the guidance of an adviser, to meet requirements for the M.P.S. degree. This report should preferably deal with the student's area of concentration.

Required Program for M.P.S. Track I Students

<i>Specifically required courses</i>	<i>Credits</i>
H Adm 173, 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 Studies in Project Development and Construction	3
H Adm 752, Graduate Study in Electrical and Mechanical Systems	3
H Adm 771, Graduate Food Chemistry	4
H Adm 800, Monograph I	3
H Adm 801, Monograph II	2
<i>Total specifically required credits</i>	<i>39</i>
<i>Elective credits</i>	<i>25</i>
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 organization participating in the management-intern arrangements. Management-intern programs are currently in operation at several locations, including the Statler Inn on the University campus. Students receive both academic credit and practice credit, and appropriate financial remuneration for the period of the program. The student is charged reduced tuition.

Course Information

For the most current and detailed information regarding course offerings of the School of Hotel Administration, the student should consult the supplementary course announcement issued each semester by the school's registrar.

Administrative and General Management Courses

101 Orientation Fall or spring. 1 credit. S-U grades only. Required.
M 12:20.

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. Hotel elective.
F 1:25. Office of the dean.

A series of lectures given by individuals prominent in the hotel, restaurant, and allied fields.

200 Personal Real Estate Investments Fall or spring. 2 credits. Limited to juniors and seniors from outside the School of Hotel Administration. Hotel elective.
T 1:25–3:15. 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.

203 Club Management Fall or spring. 2 credits. Hotel elective.

T 10:10–12:05. Faculty and guest lecturers. The private-membership club, and how it differs from other business forms in the hospitality industry. Emphasis is on legal and operational aspects of ownership and governance. All types are discussed, from the small in-town luncheon club to the large, complex suburban operation. New developments in the field are surveyed. Club managers serve as guest lecturers.

204 Franchising in the Hospitality Industry Fall. 2 credits. Hotel elective.

M 12:20–2:15. D. E. Whitehead. Relationships between franchisor and franchisee, advantages and disadvantages of franchising, structure and services offered by franchisors. Case studies of leading motor-inn and restaurant companies currently offering franchises. Guest speakers from the franchising industry.

205 Resort and Condominium Management Spring. 3 credits. Hotel elective.

T 1:25, R 2:30–4:25. M. A. Noden. The operation of resort hotels and condominiums. Resorts of various types, seasons, and economic levels are considered. Emphasis is on the promotion of business, the provision of facilities, services, and guest entertainment, and the selection, training, and direction of the employed staff. Terminology, rental-pool agreements, and S.E.C. regulations, together with developer-management-owner contracts and relationships in condominiums, are reviewed.

206 General Insurance Fall. 3 credits. Hotel elective.

M W F 12:20. K. McNeill. A comprehensive introduction to the insurance field. The emphasis is on fire insurance, casualty insurance, and multiple-peril policies. Topics covered may include: the law of contracts as it relates to insurance; the fire insurance policy and fire insurance forms; business interruption, marine, burglary, crime, and liability insurance; rates and rate making; bonds; negligence and torts; compensation; package policies; adjustment of losses; and types of insurers.

[301 Development of a Hospitality Property] Fall. 3 credits. Hotel elective. Not offered 1981–82.
M 2:30–4:25. D. E. Whitehead.

Seminar groups of two to four students develop a hospitality project. All aspects of development are covered, from the feasibility study, site acquisition, franchising, construction management, operational preopening, marketing, personnel training, furniture and fixture installation, through the opening of the hotel, motor inn, or restaurant.]

302 Principles of Management Fall or spring. 3 credits. Prerequisite: Hotel Administration 211 or equivalent. Hotel elective. Prerequisite for Hotel Administration 401.

W 11:15–1:10, 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. 2 credits. Hotel elective. Estimated cost of field trip to Washington, D.C., \$50.

F 2:30–4:25. S. Weisz (D. A. Dermody). An operational view of the front-office and reservation functions. A trip to Washington, D.C., is scheduled for late in the term. The course, under the direction of Professor Dermody, is taught by personnel of Marriott Hotels.

305 Rooms-Division Management—Housekeeping and Laundry Operations Fall. 2 credits. Hotel elective. Estimated cost of field trip to Washington, D.C., \$50.

F 10:10–12:05. S. Weisz (D. A. Dermody). The operation of the housekeeping and laundry departments.

306 General Survey of Real Estate Fall or spring. 2 credits. Prerequisite: Hotel Administration 281 and 282 or equivalent, or written permission. Hotel elective.

M 2:30–4:25. D. Sher. A practical survey of real estate as the capital-investment decision in the hospitality industry and related industries. Lectures and case studies 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.

307 Hotel Security and Crime Prevention Summer. 2 credits. Hotel elective.

M–F 9–4. J. E. H. Sherry and school faculty. Designed to provide corporate hotel management with a practical orientation for resolving the operational losses related to personal and physical-premises security. Faculty members discuss aspects of legal liability, insurance protection, architectural and interior-design controls, financial controls, and personnel administration.

401 Seminar in Management Principles Fall or spring. 2 credits. Limited to 20 seniors and graduate students. Prerequisite: Hotel Administration 302. Hotel elective.

T 11:15–1:10. P. L. Gaurnier. This course uses the case-study approach to management principles and concepts. Each student prepares a comprehensive analytical report, based on previous work, for class discussion and analysis.

402 Hotel-Management Seminar Fall. 1 credit. Limited to 20 seniors and graduate students. Hotel elective.

F 2:30. Office of the dean. Meeting with Hotel Administration 102 speakers. The subject matter varies, depending on the visitor and his or her area of expertise. Students are expected to ask questions and participate in discussions.

404 Management Organization of the Small Business Fall or spring. 3 credits. Limited to 24 seniors and School of Hotel Administration graduate students. Prerequisite: Hotel Administration 221 or Agricultural Economics 323 or equivalent. Hotel elective. Approximate cost of field trips, \$75.

T 9:05–11, R 1:25–4:25. Visiting lecturers. A comprehensive survey of basic management fundamentals to plan, organize, direct, and control the small enterprise. Course work includes a team term project, selected readings, case studies, and field exercises.

406 Integrated Case Studies in the Hospitality Industry Fall or spring. 3 credits. Limited to 24 seniors and graduate students. Hotel elective.

W 1:25–4:25. P. L. Gaurnier, R. Kastner. Analysis of case studies involving issues of business strategy, human relations, administration, marketing, and finance. Students apply course principles in a restaurant-management simulation exercise.

407 Seminar in Hotel Operations Spring. 2 credits. Limited to 30 seniors and graduate students. Hotel elective. Estimated cost of field trip, \$30.

F 10:10–12:05. P. 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. Major topics include: staff planning, budgeting, scheduling and payroll control, forecasting technique and practice, considerations for operating within the guidelines of collective bargaining, financial-statement analysis, and hotel case studies oriented toward productivity analysis. A field trip, usually in the third week, is required.

408 Casino Management Fall or spring. 2 credits. Limited to 50 School of Hotel Administration seniors and graduate students. Hotel elective. Estimated cost of field trip, \$100.

M 2:30–4:25. D. E. Whitehead and guest lecturers. The management responsibility of casino operations. Overview and analysis of casino administration, with emphasis on the relationships between and responsibilities of the hotel general manager and the casino manager, marketing and junkets, physical layouts, licensing, government regulation, personnel and training, internal controls, and security systems. General instruction in basic casino games, including odds, percentages, and strategy. Includes a weekend field trip to Atlantic City.

409 T.A. Training in Administrative and General Management Fall or spring. 1–3 credits.

Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty. The student planning to be a teaching assistant in administrative and general management is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

701 Graduate Seminar in Hotel Operations Fall. 2 credits. Limited to 30 graduate students. Hotel elective. Estimated cost of field trip, \$75.

F 10:10–12:05. P. L. 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. Major topics include: staff planning, budgeting, scheduling and payroll control, forecasting technique and practice, considerations for operating within the guidelines of collective bargaining, financial-statement analysis, and hotel case studies oriented toward financial-statement analysis and toward productivity analysis. A required field trip to the participating hotel is an

integral part of the study program. The field trip is usually scheduled for the second week of classes; students therefore *cannot* miss the first week and register in the course. Students who intend to return to school one week late should not attempt to preregister for this course.

Human-Resources Management Courses

111 Introductory Psychology Fall or spring. 3 credits. Required.

M W F 9:05; 2-hour lab. F. Berger.
An introductory study of psychological principles essential for understanding human behavior. Basic concepts integral to effective hotel management are treated, including perception, motivation, learning, and personality.

211 Management of Human Resources Fall or spring. 3 credits. Prerequisite for hotel students: Hotel Administration 111. Required.

Lecs, M W 11:15, 12:20, or 1:25; 1-hour lab to be arranged. D. A. Dermody.
Problems of personnel management, including an introduction to the personnel function; recruitment, selection, and placement of personnel; the role of supervision with emphasis on induction, training, communications, performance appraisal, and leadership style; wage and salary administration; motivation; and union-management relations. Emphasis is on class discussion and analysis of case problems from business and industry.

311 Union-Management Relations in Private Industry: A Survey Fall. 3 credits. Limited to juniors, seniors, graduate students, and those who have received written permission of the instructor. Hotel elective.

T 1:25–3:15, W 1:25. F. A. Herman.
Major areas of study include the development of the trade-union movement in the United States, with emphasis on the history and structure of unions active in all phases of the hospitality industry; federal and state laws governing the bargaining relationship, including the role of the National Labor Relations Board; the collective-bargaining process, including negotiations and contract administration; and the critical role of conciliation procedures (such as mediation and arbitration) in keeping industrial peace.

314 Psychology in Business and Industry Fall or spring. 3 credits. Prerequisites: Hotel Administration 111 and 211, or equivalent. Limited to 50 School of Hotel Administration students. Hotel elective.

Students who plan to take Hotel Administration 315 should plan to take 314 first.
T 12:20, R 12:20–2:15. S. W. Davis.
The principles of psychology applied to industrial and business systems; personnel selection; placement and training; problems at work, including evaluation, motivation, efficiency, and fatigue; and the social psychology of the work organization.

411 Hotel Manpower Management Simulation Spring. 3 credits. Limited to 15 School of Hotel Administration seniors and graduate students. Hotel elective.

R 2–4:30. S. W. Davis.
The course, based on the simulation of a profit-making facility and of a nonprofit facility, provides advanced training in the use of simulation as a training device. Groups of four or five students develop a simulation exercise.

416 Special Studies in the Management of Human Resources Fall. 3 credits. Prerequisite: Hotel Administration 211. Limited to seniors and graduate students, except for those who have received written permission of the instructor. Hotel elective.

M 7:30–9:30 p.m., T 1:25–2:15. D. A. Dermody and guest lecturers.

A case-study approach to the problems and challenges of managing people in business organizations. Actual cases are presented for discussion by individuals who were involved in the cases.

419 T.A. Training in Human-Resources Management Fall or spring. 1–3 credits.

Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.
The student planning to be a teaching assistant in human-resources management is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

711 Dispute Resolution in Service Industries

Spring. 3 credits. Limited to graduate students and seniors who have received written permission of instructor. Hotel elective.

W 2:30–5:30. F. A. Herman.
The nature of conflicts that arise during negotiation of new labor contracts (interest disputes), and those that arise over the meaning and interpretation of labor contracts already in force (grievance disputes). Methods for resolving conflicts in nonunionized properties are also explored. Picketing, recognition, certification and decertification, unfair labor practices, successor rights and obligations, pre-election behavior, and the practical applications of grievance handling through the final step of the procedure (usually arbitration) are discussed and illustrated.

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.

Intended for students who desire a general knowledge of the language of business and finance.

M 2:30–4:25. Financial-management staff.
A survey of accounting principles, financial statements, cash forecasting, cash budgeting, and an introduction to financial analysis.

121 Financial Accounting Fall. 3 credits.

Required. Limited to School of Hotel Administration students.

Lec, M W 10:10; 1-hour lab to be arranged.
D. H. Ferguson.

An introduction to the basic principles of accounting, involving transactions analysis, flow of accounting data to the financial statements, and careful consideration of accounting for revenues, expenses, assets, liabilities, and owner's equity.

122 Hospitality Accounting Systems Fall or spring. 3 credits. Prerequisite: Hotel Administration 121 or equivalent. Required.

Lecs, T R 9:05; 2-hour lab to be arranged.
D. C. Dunn.

The accounting systems recommended by the American Hotel and Motel Association, the National Restaurant Association, and the Club Managers' Association of America for hotels, motels, restaurants, and clubs. Topics include hotel and motel front-office accounting; accounting for the restaurant and other sales areas; special journals and ledger accounts peculiar to hospitality-accounting systems; the flow of accounting transactions through the accounting system; and the preparation and interpretation of financial statements.

125 Finance Fall or spring. 3 credits. Prerequisite: Hotel Administration 121 or equivalent. Required.

M W 11:15; 1-hour T lab to be arranged.
R. M. Chase.

An objective study of financial management in profit-oriented enterprises. Important concepts include cash flow, the time value of money, and capital budgeting. Emphasis is on the analysis of accounting information, problem solving, and decision making.

220 Financial Accounting Principles Fall or spring. 3 credits. Limited to students outside the School of Hotel Administration in the fall; in the spring, hotel students may substitute this course for 121.

Lecs, M W 10:10; 1-hour lab to be arranged.
Faculty.

The basic principles of accounting, including transactions analysis, and flow of accounting data to the financial statements. Emphasis is on accounting for revenues, expenses, assets, liabilities, and owner's equity.

221 Managerial Accounting Fall. 3 credits.

Prerequisites: Hotel Administration 121 and 125, or equivalent. Required.

Lecs, T R 10:10; 2-hour lab to be arranged. Two evening exams to be arranged. A. N. Geller.
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 Spring. 3 credits. Limited to 160 students.

Prerequisite: Hotel Administration 122 or 221 or equivalent. Required.

Lecs, M W 10:10; 1-hour lab to be arranged.
J. J. Eyster.

Methods of operational analyses for hospitality properties are evaluated and used in ratio, comparative, and cost-volume-profit analyses. Other topics include internal control, operational budgeting, and the use of feasibility studies in long-term capital-budgeting decisions. Stress is on presenting analysis results in management letters.

223 Front-Office Machine Accounting Fall or spring. 1 credit. Prerequisite: Hotel Administration 121 or equivalent. Hotel elective.

Two-hour practice lab to be arranged. D. C. Dunn.
Students learn the operation of the NCR front-office posting machine by completing a series of practical exercises, ranging from simple posting of charges and credits to error correction and the night audit.

321 Hotel-Management Contracts Fall, weeks 2–8. 1 credit. Limited to 60 juniors, seniors, and second-year graduate students. Hotel elective.

M 12:20–2:15. J. J. Eyster and guest lecturers.
A critical analysis of the negotiation and administration of hotel-management contracts. Topics include: advantages, disadvantages, and risks of contracts to both owners and operators; owner and operator concerns during negotiations and their resolution; owner and operator concerns during administration of the contract; and the future role of contract use. Guest lecturers include owners and operators.

322 Investment Management Fall or spring. 2 credits. Limited to juniors, seniors, and graduate students. Hotel elective.

T 2:30–4:25. R. Kastner.
A survey of investment opportunities and the methods of analysis used by business and the individual to determine the best use of investment funds. Special emphasis is placed on the stock and bond markets, including security portfolio management. Background in accounting and finance recommended, but not required.

323 Financial Analysis and Planning Fall. 3 credits. Prerequisite: Hotel Administration 222. Hotel elective.

M W 8:30–10. Faculty.

After defining and describing the environment in which a business organization must design its strategy, an examination will be made of financial-analysis and planning techniques necessary to operate in that environment. Focus is on discussion and case studies involving the following areas of financial management: the tax environment, profit planning and forecasting, budgeting, capital-budgeting techniques, and cost-of-capital determination.

324 Financial Charts and Graphs Spring, weeks 2–8. 1 credit. Limited to 20 students. Prerequisite: Hotel Administration 251 and 221. Hotel elective.

W 2:30–4:25. R. H. Penner.

An introduction to and concentrated study of financial charting—the visual presentation of quantitative data. Includes a review of the several types of charts and graphs and their use to show relative or proportionate amount, trend, et cetera. Students analyze and evaluate charts from annual reports and the media, and design charts to communicate data effectively.

[326 Introduction to Statistical Analysis and Inference

Fall. 3 credits. Limited to juniors, seniors, and graduate students. Students with any previous exposure to statistics or probability should see the instructor before enrollment. Hotel elective. Not offered 1981–82.

T R 11:15–1:10. D. C. Dunn.

An introduction to the basic techniques of statistical method.]

421 Internal Control in Hotels Spring. 2 credits. Prerequisite: Hotel Administration 122 or equivalent. Limited to seniors and other students who have received permission of instructor. Hotel elective.

T R 9:05 or 10:10. A. N. Geller.

Discussion of problems encountered in distributing the accounting and clerical work in hotels to ensure a good system of internal control. Study of many actual cases of the failure of internal control and the analysis of the causes of the failure. Practical problems and actual techniques of functioning systems of internal control.

422 Personal and Corporate Taxation Fall. 2 credits. Limited to 50 juniors, seniors, and graduate students. Hotel elective.

W 2:30–4:25. Financial-management faculty.

An introduction to: tax advantages and disadvantages of various organizational structures, including corporations, partnerships, and subchapter S corporations; financial-information reporting to tax authorities and shareholders; use of depreciation methods to achieve tax reductions; syndication techniques; and the role tax laws play in promoting private investment and development.

429 T.A. Training in Accounting and Financial Management

Fall or spring. 1–3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student who plans to be a teaching assistant in accounting and financial management is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

722 Graduate Managerial Accounting in the Hospitality Industry

Spring. 3 credits. Required M.P.S. course.

T 2:30–4:25, R 11:15–1:10. J. J. Eyster.

Hotel and restaurant accounting systems that provide decision-making information to management are reviewed. Methods of operational analysis for hospitality properties are evaluated and utilized to include ratio, comparative, and cost-volume-profit analyses. Other topics include internal control, operational budgeting, and the use of feasibility studies in long-term capital-budgeting decisions. Stress is on communicating analysis results using management letters.

723 Graduate Corporate Finance

Fall. 4 credits. Prerequisite: Hotel Administration 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 section to be arranged. A. N. Geller.

An introduction to the principles and practices of business finance, including the development of theory and its application in case studies. Specific topics include types of securities and their uses, valuation concepts, capital budgeting, cost of capital, capital structure, dividend policy, long-term financing and bank relations, short- and intermediate-term financial management, mergers and consolidations, and the legal aspects of financial management.

724 Interpretation and Analysis of Financial Statements

Spring. 3 credits. Limited to 20 second-year graduate students. Prerequisite: all required hotel accounting courses. Hotel elective.

Sem, R 2–5. A. N. Geller.

The various financial accounting issues encountered in reporting the results of operations of corporate enterprises are discussed. A macro view of the firm will be taken, with emphasis on both outsiders' views of the operation and decision making through interpretation of the published statements. Current generally accepted accounting principles and future extensions are explored and discussed. Emphasis is on the components of financial statements, how and why they are reported, and their impact on the overall financial position of the firm.

Food and Beverage Management Courses

131 Introduction to Food and Beverage Operation and Management

Fall or spring. 2 credits. Required.

W 11:15–1:10. D. D'Aprix, coordinator.

An introductory course designed to familiarize students with the language and systems of commercial food and beverage operations. The language of food production, equipment, utilities, preparation, cooking, beverage, and service will compose the major portion of the course.

132 Techniques of Food Production

Fall or spring. 1 credit. Prerequisite: Hotel Administration 131. Required.

3-hour section to be arranged. T. A. O'Connor.

A laboratory-based course designed to familiarize students with techniques of food preparation. Practical application of information gained in Hotel Administration 131. Each student must supply cook's knife.

231 Meat Science and Management

Fall or spring. 3 credits. Required. Estimated cost of field trip, \$75.

Lec, M 2:30–4:25; 2-hour lab to be arranged.

S. A. Mutkoski.

Deals with the major phases of meat, poultry, and fish service from the hotel, restaurant, club, and institutional standpoints; nutritive value, structure, and composition; sanitation; selection and purchasing; cutting, freezing, portion control, and specifications; cooking, carving, and miscellaneous topics. A three-day field trip to visit purveyors in New York is required.

233 Food Production Systems: Cafeterias

Fall or spring. 3 credits. Prerequisites: Hotel Administration 131, 132, 172, 173. Required.

Lec, M 1:25; 6-hour afternoon lab. A. L. Colucci.

A cafeteria food-production course in which the

student participates as a team member in hot-food, cold-food, dessert, and bakery production. Lectures cover principles of cafeteria menu planning, truth-in-menu, recipe standardization, support areas, sanitation, calculating raw food costs, menu-pricing systems, convenience foods, and types of production systems. Students are required to purchase their own french, boning, and paring knives; measuring spoons; and food thermometer. Students work six to seven weeks each in two different cafeterias.

234 Food and Beverage Control

Fall or spring. 2 credits. Prerequisite: Hotel Administration 122 or written permission of instructor. Hotel elective.

M 10:10–12:05. T. P. Cullen.

Food and beverage operation from the position of the food and beverage controller and analyst are studied. Control systems and analytical techniques are discussed and applied to operational situations.

331 Food Production Systems: Restaurants

Fall or spring. 3 credits. Prerequisite: Hotel Administration 231 and 233. Required. Estimated expense of clothing and utensils, \$95.

Lec, M 1:25; 8-hour lab M, T, W, or R. G. X. Norkus.

This course is designed to provide the student with the skills necessary to perform the management functions of a restaurant.

333 Corporate Restaurant Management

Fall. 3 credits. Prerequisite: Hotel Administration 232. Limited to 30 seniors and graduate students. Hotel elective. Estimated cost of field trip, \$100.

T 10:10, R 9:05–11; labs to be arranged.

V. A. Christian.

Principles of modern restaurant management as they relate to small and large corporate organizations. Case studies and lectures cover such topics as: managerial and technical duties, governmental regulations, and guest demands. A field trip to Washington, D.C., is conducted. This course is recommended only for those with intensive interest in food and beverage management.

337 Survey of Beverages

Fall or spring. 2 credits. Limited to seniors and second-year graduate students in the School of Hotel Administration. Hotel elective. Fee for tasting equipment, \$5.

W 7:30–9:25. V. A. Christian.

An introduction to wines, beers, spirits, and other beverages as they relate to the hospitality industry. Samples from a variety of countries, regions, and vineyards are evaluated.

338 Purchasing

Spring. 2 credits. Limited to 65 juniors, seniors, and graduate students in the School of Hotel Administration. Hotel elective.

W 2:30–4:25. S. A. Mutkoski.

An in-depth look into the functions of a purchasing department within a hotel or restaurant facility. The managerial aspects of purchasing, such as setting up a purchasing department, the function of the purchasing agent, purchasing specifications, purchasing forms, and controls are considered. Includes many of the products purchased by a food facility, such as china, flatware, glasses, fabric, meat, frozen foods, canned goods, produce, dairy products. The products are displayed by leading purveyors and discussed in detail.

430 Introduction to Wine and Spirits

Fall or spring. 2 credits. Limited to seniors and graduate students outside the School of Hotel Administration. S-U grades only.

W 2:30–4:25. V. A. Christian.

The course begins with the history of wine and spirits. The main focus is on flavor characteristics, fermentation processes, and brand specifications. Lectures are also given on purchasing, storage, wine-tasting techniques, and drink formulas. Samples from a variety of countries, regions, and vineyards are evaluated. Pre-enrolled students who do not attend the first class and fail to notify the secretary in Statler 212 of their absence are automatically dropped from the course.

434 Production and Merchandising of Desserts

Fall or spring. 3 credits. Prerequisites: Hotel Administration 232, 331, or 732. Hotel elective.

Lec, F 12:30; lab, F 1:30–5:30. J. Cameron.
How to make and profitably merchandise such desserts as pies, sweet-dough pastries, danish and puff pastry, paté choux, cookies, cakes, ice desserts, and other specialty desserts.

439 T.A. Training in Food and Beverage Management

Fall or spring. 1–3 credits.

Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student who plans to be a teaching assistant in food and beverage management is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

731 Graduate Food and Beverage Management

Fall or spring. 3 credits. Required M.P.S. course.

Estimated cost of field trip, \$100.

Lecs, T 10:10–12:05, R 10:10–11:00; three 7:30–9:30 p.m. sessions to be arranged.

V. A. Christian.

The managerial and operational principles and techniques of planning, operating, and evaluating a food and beverage operation. Special emphasis is placed on menu planning, wine-list design, professional standards, and the managerial approach to purchasing, receiving, storage, issuing, preparation, and service. A field trip is required.

732 Graduate Operational Food-Production Systems

Fall or spring. Limited to 30 students.

Prerequisite: Hotel Administration 731 or equivalent. Required M.P.S. course. Estimated expense for clothing and utensils, \$95.

Lec, R 2:30–5:30 or R 7–10; 8-hour F lab.

A. L. Colucci.

Students are responsible for production and service of dinner for the Statler Inn main dining room and Café Rhea. The course is designed to teach and apply the fundamentals of food-production systems, from menu planning through service, and to give the student confidence in managing a commercial kitchen or dining room. The lecture-demonstration provides further exposure to managerial as well as technical skills.

[733 Corporate Food and Beverage Management — Hyatt]

Fall. 3 credits. Prerequisites: Hotel Administration 731, 732, and written permission of instructor. Hotel elective. Estimated cost of field trip, \$125. Not offered 1981–82.

Sem, R 7–9:30 p.m. V. A. Christian and guest lecturers.

The operation of the food and beverage department of a 1,000-room commercial hotel, examining the management and day-to-day operations and support systems. Lectures are given by managers, directors, and department heads relating their experiences, problems, and successes. A working field trip of four days in Chicago is conducted. Each student spends two shifts in a department of his or her choice, working with a key staff member or department head.]

735 Graduate Meat Science and Management

Fall. 3 credits. Limited to graduate students. M.P.S. elective.

M 5:30–8:30 p.m. S. A. Mutkoski.

Purchasing, receiving, storage, utilization, and cost analysis of meat, fish, poultry, and meat extenders and analogs are discussed from the standpoint of commercial food service in a seminar-lab combination. Independent research on current problems in meat science and management is required.

Law Courses

247 Law and the Woman Employee

Spring. 3 credits. Hotel elective.

M W F 12:20. J. E. H. Sherry.

Designed to enable management to deal with the legal problems of female employees as they affect the hospitality industry, and to provide information regarding the emerging legal rights of women generally.

341 Law of Business I

Fall. 3 credits. Open to juniors and seniors and a limited number of sophomores. Required.

M W F 10:10. J. E. H. Sherry.

A basic introduction to law and legal relationships in business. A variety of subjects are covered, all intended to aid managers in decision making.

342 Law of Business II

Spring. 3 credits.

Prerequisite: Hotel Administration 341. Hotel elective.

M W F 10:10. J. E. H. Sherry.

A continuation of 341 for those students who desire more extensive legal training to further their business careers. Emphasis is on the laws pertaining to the Uniform Commercial Code (sales and negotiable instruments); bailments; trusts and estates; transfers by will; unfair competition and trade regulation; bankruptcy; and insurance.

343 Law of Securities Regulation

Fall. 1 credit.

Open to juniors, seniors, and graduate students. Best taken after an introductory course in business law. Hotel elective.

M 1:25–3:20 (every other M). P. Panarites.

The overall objective is to acquaint the student with the application of federal securities laws to the hospitality industry. The course covers financing of capital requirements through the sale of stocks and bonds, the obligations of publicly owned hospitality companies and their directors and officers, and the regulatory role of the Securities and Exchange Commission. Emphasis is on the rights and responsibilities of members of management, using problems drawn from the hospitality industry.

344 Law of Innkeeping

Fall or spring. 3 credits.

Prerequisite or corequisite: Hotel Administration 341 or equivalent. Required.

M W F 9:05. J. E. H. Sherry.

A basic grounding in the fundamentals of hotel and restaurant management as they affect legal rights and responsibilities. Emphasis is on recognition of issues and organization of solutions in a logical, well-conceived manner.

449 T.A. Training in Law

Fall or spring. 1–3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student who plans to be a teaching assistant in law is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

744 Law of Innkeeping for Graduate Students

Fall or spring. 3 credits. Required M.P.S. course.

M W F 8. J. E. H. Sherry.

A review of fundamentals followed by an in-depth consideration of the legal aspects of the hospitality industry.

Properties Management Courses

251 Property-Management Graphics

Fall or spring. 3 credits. Required.

Lecs, M W 9:05; 2-hour lab to be arranged.

R. H. Penner.

An introduction to both properties management and hospitality facilities. Components of the course include projection and architectural drawing, site analysis and planning, and hotel functional design. Lab emphasis is on basic graphic skills, including the layout of lodging and dining spaces, and the interpretation of construction drawings.

351 Hotel Mechanical and Electrical Problems I

Fall. 3 credits. Prerequisite: Hotel Administration 251. Required.

Lecs, M W F 11:15; 2-hour lab to be arranged.

Properties-management staff.

Investigation of management problems associated with the mechanical systems of the physical plant. Utility management and energy conservation are emphasized. Water, electricity, and lighting systems as well as sound and acoustics are covered. Basic engineering theory of each system is taught. Capital, operating, and repair and maintenance costs are stressed.

352 Hotel Mechanical and Electrical Problems II

Spring. 3 credits. Prerequisite: Hotel Administration 351. Required. Approximate cost of AIA articles and binders, 75¢.

Lecs, M W F 11:15; 2-hour lab to be arranged.

R. A. Compton and staff.

Investigation of management problems associated with the mechanical systems of the physical plant, with emphasis on major systems of heating, refrigeration, and air conditioning. The problems of capital expenditures, operating costs, and repairs and maintenance are stressed.

353 Introductory Food Facilities Engineering

Fall. 3 credits. Limited to 12 students. Prerequisite: Hotel Administration 251 or equivalent, and written permission of instructor before course registration. Hotel elective.

Lecs, M W 1:25; 2-hour lab to be arranged.

R. A. Compton.

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. Labs involve planning, design, and specification writing for a small- to medium-size restaurant kitchen.

354 Food-Facilities Equipment Design and Layout

Spring. 3 credits. Prerequisite: Hotel Administration 353 or equivalent.

Lecs, M W 1:25; 2-hour lab to be arranged.

R. A. Compton and M. H. Redlin.

A course designed to apply the basic concepts of food-facilities design to advanced applications. Emphasizes preparing a program, developing and critiquing equipment layouts, mechanical and electrical spotting, and equipment-detail drawings.

451 Physical-Plant Planning and Construction

Fall or spring. 3 credits. Prerequisite: Hotel Administration 352. Required. Approximate cost for published articles, \$5.

Lecs, M W F 12:20–1:10; 2-hour lab to be arranged.

Fall, R. A. Compton; spring,

R. A. Compton, R. H. Penner.

The construction, renovation, and maintenance of hotels and food-service operations are discussed and analyzed. Procedures, methods, and materials used in new construction projects are covered, as is

repair, rehabilitation, and renovation of existing structures. Building codes, trade practices, materials, cost estimation, and management responsibilities are emphasized.

453 Seminar in Environmental Control Fall. 3 credits. Limited to 10 students. Prerequisite: Hotel Administration 351, 352, and written permission of instructor before registration. Hotel elective.

Hours to be arranged. J. J. Clark.

Application of topics covered in Hotel Administration 351-352 to real-life projects. Projects for a given term are decided at an early seminar and emphasize utility management and control, internal environmental control (light, HVAC, acoustics), and ecological considerations.

454 Seminar in Hotel Planning Fall. 3 credits. Prerequisite: Hotel Administration 351 and written permission of instructor prior to course registration. Limited to 12 students. Hotel elective. A field trip may be required; estimated cost, \$150.

T R 11:15-1:10. R. H. Penner.

The hotel planning process, emphasizing program development, site selection, conceptual design, and building systems. Discussion of space allocation, hotel equipment and furnishings, establishing budgets, and responsibilities of the development team. One or two team projects are developed.

455 Seminar in Restaurant Planning Spring. 3 credits. Limited to 12 students. Prerequisite: Hotel Administration 351. Hotel elective. Estimated cost of field trip, \$150.

M W F 9:05. R. A. Compton.

The procedures followed in the planning of a restaurant facility. Primary emphasis is on design, engineering, and construction. Discussions of space allocation, trade practices, building and health codes, equipment and furnishings, cost estimations, and management responsibilities when working with professional planners. Case studies are used and a project is developed.

459 T.A. Training in Properties Management Fall or spring. 1-3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student who plans to be a teaching assistant in properties management is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

751 Graduate Study in Project Development and Construction Fall. 3 credits. Required M.P.S. course.

Lec, T R 8:30-9:45; 2-hour lab to be arranged.

M. H. Redlin.

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. Estimated cost of AIA articles and binders, \$4.

Lecs, T R 8:40-9:55; 2-hour lab to be arranged.

J. J. Clark.

The major electromechanical systems of large buildings and lodging properties are considered from a capital-cost versus operating-cost viewpoint. Includes consideration of water, heating, refrigeration, air conditioning, electrical, and lighting systems. Concepts of energy conservation and efficient utilities management, beginning with the original selection of equipment through operating procedures, are emphasized. Students analyze case studies, criticize papers and reports, and suggest new systems and modifications.

Communication Courses

161 Typewriting Fall or spring. 2 credits. Hotel elective.

M W F 10:10 or 11:15, or T R F 9:05. B. B. David. A course in elementary typewriting, designed for students who want to learn touch-typing.

165 Basic Business Writing Fall or spring. 3 credits. Each section limited to 20 students. Required.

M W 9:05, 10:10, 11:15, 1:25, 2:30, 3:35, or F 10:10, 11:15. D. A. Jameson, D. G. Flash, J. Lumley, C. Solomon.

This course focuses on strengthening skills in outlining, organizing, understanding, and using research sources, and developing skills in writing clearly and precisely. To apply these skills, students write both internal and external reports.

261 Report Typing Fall or spring. 2 credits.

Limited to 24 students. Prerequisite: Hotel Administration 161 or equivalent. Hotel elective.

T R 10:10. B. B. David.

A course in electric touch-typing designed for students who can type but want to improve their speed and accuracy. Special emphasis is placed on the typewritten report as a form of communication. Business letters are typed in various styles and their effectiveness is studied.

262 Typewriting and Business Procedures Fall or spring. 3 credits. Limited to 24 students.

Prerequisite: Hotel Administration 161 or equivalent. Hotel elective.

M W F 12:20. B. B. David.

Students who already know touch-typing develop sufficient speed and accuracy on electric typewriters to meet business standards for an executive assistant in the typing and composing of business letters and special forms of business communication, including tabulated reports. Instruction in filing, duplicating processes, and machine transcription is provided.

263 Shorthand Theory Fall or spring. 3 credits. Limited to 32 students. Prerequisite: a typing course. Hotel elective.

M W R 1:25. B. B. David.

The basic theory of Gregg shorthand is completed. 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 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 upperclass and graduate students. Hotel elective.

F 9:05-11. D. A. Jameson.

This course focuses on the written communications that demand special persuasiveness and control of

tone. Some examples of the kinds of communications that are analyzed, evaluated, and written are negative messages, such as refusals, rejections, and responses to complaints; persuasive administrative messages to both subordinates and superiors in an organization; and sales letters and other promotion materials. How to plan and execute a job-hunting campaign, both before college graduation and later in one's career, is discussed. Students prepare résumés, letters of application, and follow-up messages adapted to their individual needs.

469 T.A. Training in Communication Fall or spring. 1-3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student who plans to be a teaching assistant in communication is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

Science and Technology Courses

171 Food Chemistry I Fall. 3 credits. Required.

Lecs, M W F 8; 1-hour lab to be arranged on R. M. H. Tabacchi.

Principles and concepts of inorganic and organic chemistry, with emphasis on chemical reactions that deal 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: Hotel Administration 171 or equivalent. Required.

Lecs, M W F 8; 3-hour lab to be arranged.

P. Rainsford.

The chemistry of fats, carbohydrates, and proteins is emphasized in relation to food products and food-production techniques. The roles of additives in food, colloidal phenomena, food processing, and reconstitution techniques are studied.

173 Sanitation in the Food Service Operation

Fall or spring. 2 credits. Required.

Lec, T 1:25; 2-hour lab to be arranged.

B. Richmond.

The causes and prevention of food spoilage and food-borne disease. Sanitary principles applied to the hospitality industry, including laws, rules, and regulations. Practice in general methods for 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. D. H. Ferguson.

An introduction to information systems and computing machines. Students learn basic programming skills for application to selected business problems. The concept of file processing is introduced to provide the student with an understanding of computing as it applies to the hospitality industry. Programs are executed on the University's computing system.

274 Hotel Computing Applications Fall or spring. 3 credits. Prerequisite: Hotel Administration 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. Labs will provide actual experience with computer-based systems.

371 Principles of Nutrition Fall or spring. 3 credits. Prerequisites: Hotel Administration 171 and 172 or equivalent chemistry courses. Elective. M W F 12:20. M. H. Tabacchi.

Designed especially for students interested in the food industry. The nutrient composition of fresh and processed foods, nutrient handbooks, recommended daily allowances, nutrition labeling, additives, special diets, fad diets, and weight control. The uses of nutrients and nutrient interactions are emphasized.

374 Advanced Programming and Systems Design

Fall or spring. 3 credits. Elective. Prerequisite: Hotel Administration 174 or 774 or equivalent. Not offered fall 1981.

T R 12:20, plus recitation to be arranged.

R. G. Moore.

Programming in Business Basic, an interactive, easily learned computer language commonly used on small business computers; installing a computerized business system and processing information; and designing a business computer system using data-base management programs on an IBM 5110 computer. The course is intended for students who expect to be working with computer systems and desire experience in hospitality electronic data processing.

479 T.A. Training in Science and Technology Fall or spring. 1-3 credits. Prerequisite: written permission of instructor. Hotel elective.

Hours to be arranged. Faculty.

The student who plans to be a teaching assistant in science or technology is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

771 Graduate Food Chemistry

Fall. 4 credits. Required M.P.S. course. Lecrs, M W F 10:10; 2½-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. Additives in foodstuffs, colloidal phenomena, food processing, and reconstitution techniques are studied. Heat transfer and energy as they relate to food chemistry are discussed.

774 Computers and Hotel Computing Applications

Fall or spring. 3 credits. Required M.P.S. course. Limited to 30 students. Lecrs, M 2:30-4:25, W 1:25; 2-hour lab to be arranged. R. G. Moore.

The first segment of the course is devoted to learning computer concepts and programming in Basic. During the second part of the course, the introduction of the computing machine to the hospitality industry is examined from several viewpoints: managerial impact, cost justification, user reaction, and guest satisfaction. The various successes and failures of hotel computing systems are analyzed in detail. Students in the course work with various small hotel and restaurant systems.

Economics, Marketing, and Tourism Courses

281 Macroeconomics

Fall. 3 credits. Required. M W 12:20-1:10; 1-hour sec to be arranged. D. Sher.

Modern economic problems are examined in historical perspective, as national issues, and in the economic context of business decisions.

282 Microeconomics

Spring. 3 credits. Required. M W F 12:20-1:10; rec to be arranged on R or F. 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 Tourism

Fall. 3 credits. Hotel elective. T 1:25, R 2:30-4:25. M. A. Noden. The primary characteristics of foreign and domestic tourism. Areas of concern include geographic considerations, development of infrastructure and superstructure in host countries, travel delivery systems, and the social and cultural aspects of tourism. Transportation, the travel-service industries, and the socioeconomic effects of tourism on developing countries are emphasized. Consideration is also given to travel research and marketing.

285 Hotel Sales

Fall or spring. 2 credits. Hotel elective. F 2:30-4:25. Faculty. A practical approach to the selling of hotel space with particular emphasis on selling to and effectively serving groups.

381 Advertising and Public Relations

Fall. 2 credits. Limited to juniors, seniors, and graduate students. Hotel elective. F 11:15-1:10. Faculty. This is the first of two courses covering the essential phases of hotel-motel marketing. Topics include advertising, publicity, public relations, and sales communication.

382 Cases in Hospitality Marketing

Spring. 2 credits. Hotel elective. Prerequisite: Hotel Administration 384 or 781. M 1:25-3:15. W. H. Kaven. A case-study course focusing on market planning; marketing strategy formulation; price, promotion, place, and product-program design.

383 Seminar in Selected Topics in Hospitality Marketing

Fall or spring. 2 credits. Prerequisite: Hotel Administration 384 or 781. Hotel elective. M W 4:30-6:15. Faculty. The marketing strategy and its development through opportunity analysis, research, and target-market selection. A continuing seminar that changes focus each semester over a four-semester cycle. Devoted to topics of current interest each semester. Course topic announced in advance each semester.

384 Principles of Marketing

Fall or spring. 3 credits. Required. R 8-9:30. W. H. Kaven. The economic principles of marketing, with emphasis on the marketing of services.

481 Seminar in Advertising and Public Relations

Fall. 2 credits. Prerequisite: Hotel Administration 381. Hotel elective. F 2:30-4:25. Faculty. Case histories of the advertising, publicity, business promotion, and public relations of hotels, resorts, restaurants, and national travel attractions are studied.

483 Psychology of Advertising

Fall. 3 credits. Limited to 30 seniors and graduate students. Prerequisites: Hotel Administration 111 and 384 or equivalent, or permission of instructor. Hotel elective. M 2:30-5 and 7-9:30 p.m. (every other M). P. C. Yesawich. The principles of psychology employed in advertising. Topics include learning, perception, motivation, advertising research, consumer behavior, and advertising strategy.

489 T.A. Training in Economics, Marketing, and Tourism

Fall and spring. 1-3 credits. Prerequisite: written permission of instructor. Hotel elective. Hours to be arranged. Faculty. The student who plans to be a teaching assistant in economics, marketing, or tourism is exposed to recommended techniques of instruction and such other methodology, readings, et cetera, as the professor in charge of the course may require.

781 Marketing Management

Spring. 3 credits. Required M.P.S. course. T 11:15-1:10, W 11:15. Faculty. Hospitality marketing management decision making. Emphasis is on managerial analysis of the marketing environment; market opportunity analysis; and marketing-strategy design, implementation, and control.

Independent Research Courses

600-680 Undergraduate Independent Research

Fall or spring. Variable credit. Prerequisite: written permission. Hotel elective. *Only the first three credits of directed study may count as hotel electives during the student's undergraduate academic career.* Additional directed study, if taken, is applied toward free electives, except for the management-intern program of 12 credits. *Permission in writing is required before course enrollment.*

Faculty.

Students pursue independent research projects under the direction of a faculty member.

600 Administrative and General Management

601 Management Intern Program I—Operations

6 credits.

602 Management Intern Program II—Academic

6 credits.

610 Human Resources Management

620 Accounting and Financial Management

630 Food and Beverage Management

640 Law

650 Properties Management

660 Communication

670 Science and Technology

680 Economics, Marketing, and Tourism

700-900 Graduate Independent Research Fall or spring. Variable credit. Limited to graduate students. Prerequisite: permission of instructor. *Obtain permission form from the school's graduate office.*

Faculty.

The student plans a project and locates a faculty member willing to supervise the study.

700 Administrative and General Management

710 Human Resources Management

720 Accounting and Financial Management

730 Food and Beverage Management

740 Law

750 Properties Management

760 Communication

770 Science and Technology

780 Economics, Marketing, and Tourism

800 Monograph I

801 Monograph II

802 Master of Science Thesis Research

803 Graduate Teaching Internship

900 Doctoral Thesis Research

Faculty Roster

Beck, Robert A., Ph.D., Cornell U. Prof. of Hotel Administration
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.
Davis, Stanley W., Ph.D., Cornell U. 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.
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.
Moore, Richard G., M.B.A., Cornell U. Assoc. Prof.
Mulkoski, Stephen A., Ph.D., Cornell U. Assoc. Prof.
Penner, Richard H., M.S. Arch., Cornell U. Assoc. Prof.
Rainsford, Peter J., Ph.D., Cornell U. Assoc. Prof.
Redlin, Michael H., Ph.D., Cornell U. Assoc. Prof.
Sher, David, M.B.A., Columbia U. Assoc. Prof.
Sherry, John E. H., L.L.M., New York U. Assoc. Prof.
Tabacchi, Mary H., Ph.D., Purdue U. Assoc. Prof.

Adjunct, Visiting, and Other Teaching Staff

Bamford, Carl, A.O.S., Teaching Associate
Compton, Richard A., M.S., Senior Lecturer
D'Aprix, David, B.S., Lecturer
Flash, Dora G., A.B., Lecturer
Kastner, Robert, M.B.A., Lecturer
Lumley, Jane, M.A., Lecturer
McNeill, Keith, B.S., Lecturer
Noden, Malcolm A., Lecturer
Norkus, Gregory X., B.S., Lecturer
O'Connor, Therese A., B.S., Lecturer
Regan, Gerald T., A.O.S., Teaching Associate
Richmond, Bonnie S., M.S., Lecturer
Schmidt, Brian, B.A., Lecturer
Solomon, Cathy, M.A.T., Lecturer
Weisz, Steven, B.S., Visiting Lecturer
White, Robert, A.O.S., Teaching Associate
Whitehead, Donald E., B.S., Lecturer
Yesawich, Peter C., Ph.D., Visiting Lecturer

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, associate director of Cooperative
 Extension
 Nancy S. Meltzer, assistant dean for administrative
 services
 Lois S. Post, director, alumni affairs and development
 William H. Gauger, assistant dean, undergraduate
 education and student services
 Brenda Bricker, director, Admissions Office
 Peggy Anne Frazer, director, international program
 Joyce McAllister, registrar
 Clarence H. Reed, director, special educational
 projects
 Timothy K. Stanton, director, Field Study Office
 Lynne M. Wiley, director, placement office
 Nevart Yaghlian, director, counseling office

Facilities

The College of Human Ecology is housed in Martha Van Rensselaer Hall. The Division of Nutritional Sciences, an intercollege division supported jointly by this college and the College of Agriculture and Life Sciences, has space in Savage Hall and in Martha Van Rensselaer Hall.

The physical plant includes administrative offices, faculty offices, classrooms, auditoriums, and lecture halls; wet chemistry and biochemistry laboratories for nutrition, food science, and textile science; household equipment laboratories; experimental food laboratories; design studios; woodworking shops; a children's creative art laboratory; experimental observation rooms with one-way vision screens and sound-recording equipment; educational television studios and a printing and reproduction facility. Also included are learning resource centers (human development and family studies, home economics education, interior and product design, nutritional sciences), a historical costume collection, a human metabolic research unit, 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
Consumer Economics and Housing	B.S.
Design and Environmental Analysis	B.S.
Human Development and Family Studies	B.S.
Human Service Studies	B.S.
Nutritional Sciences	B.S.
Social Planning and Public Policy	B.S.
Individual Curriculum	B.S.

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.

Interdepartmental Major in Social Planning and Public Policy. The Department of Consumer Economics and Housing participates in the Interdepartmental Major in Social Planning and Public Policy with the Department of Human Service Studies. In this major the students acquire knowledge and skills to assess local and regional needs and to develop, implement, and evaluate policies and plans for meeting those needs, and learn to work as professionals in state and local agencies. The major is described following these departmental descriptions.

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. The major also provides 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.

Academic Advising

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.

All faculty members serve as advisers. If a student wishes, he or she may select an adviser and, work loads permitting, the choice will be approved. Talking with the advising coordinator in the department can help match the student's needs with the special interests of a faculty member. Students are free to change advisers at any time. An appointment to talk with either an adviser or the advising coordinator, Ramona Heck, may be made directly with the faculty member or through the secretary in 116 Martha Van Rensselaer Hall. 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.

Design and Environmental Analysis

The Department of Design and Environmental Analysis (DEA) is concerned with creating, selecting, and changing the quality of our near environment. The near environment begins with the individuals and encompasses the areas they occupy as they move about in work and leisure activities, at home and away from home. The program of the department emphasizes the interaction between environments and people: the needs of individuals, families, and other groups as they affect and are affected by the space, objects, and materials around them.

Options are based on subject matter in:

- 1) *Design*—the manipulation of form, space, and color to solve aesthetic and functional problems;
- 2) *The physical sciences*—the chemical, physical, and structural properties of materials such as textiles, and plastics; and
- 3) *The social sciences*—psychological, sociological, and managerial analyses of our relationship to the physical environment.

Diverse faculty backgrounds and teaching approaches lead to multidisciplinary problem solving and development of creative abilities, aesthetic judgment, and analytical thinking of students.

Laboratory and studio facilities permit exploration of textiles and other materials, and design concepts through analytical and creative problem-solving techniques. The relationship between humans and their surroundings is explored through a combination of academic courses, field experience, and applied research. Examples of student class projects, faculty work, and items from the Cornell Costume Collection are frequently on display in the department's galleries and exhibit case. The DEA Resource Center includes books, journals, materials samples, and self-instructional videotapes for student use. Items from the Costume Collection are made available to students as necessary for classroom and special study projects.

Options

The department offers undergraduate education in four professional areas: interior and product design, apparel design, textiles, 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 that 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 Ia: Interior and Product 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 III.

Careers are available in interior design and space planning, interior architecture, facility planning, interior product design, housing, and building technology. This program also serves as an excellent preparation for graduate study in interior design, facility management, architecture, and product design.

Option Ib: Apparel Design

The option in apparel design focuses on both aesthetic and functional considerations in the design of body coverings. The program emphasizes a problem approach that enables the student to integrate knowledge of design, human-environment relations, and textiles to the apparel design process. Some students combine this option with option II. 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 II: Textiles

Students explore the chemical and physical structures and properties of textiles, textile products, and other materials and consider the requirements for using these materials in the near environment. Supporting courses are found in physical sciences, design, human-environment relations, and consumer economics and housing. Some students combine this option with option Ib. The program gives excellent preparation for graduate study in many fields, including textile science and technology, business, public policy, consumer affairs, and apparel design.

Careers are available in the fiber and textile industries, government, and education. Recent graduates are active in new product development and evaluation, research, technical marketing services, consumer information, and product safety.

Option III: Human-Environment Relations

Human-environment relations is an applied behavior science program. It is a field that seeks to expand our understanding of how the environment affects human perception, cognition, motivation, performance, health, safety, and social behavior such as cooperation, conflict, and friendship formation. Its applied orientation stresses using knowledge about human behavior as a basis for designing and managing settings that support both individual and organizational objectives. Some students combine this option with option Ia. This program is a good preparation for graduate study in environmental psychology, environmental sociology, human factors, architecture, interior design, landscape architecture, and city and regional planning. The program also serves to prepare students for entry-level positions in facility planning and management departments in large public and private organizations and institutions.

Academic Advising

All DEA majors are matched with a faculty adviser during their first semester by the advising coordinator, Anita Racine, 414 Martha Van Rensselaer Hall, or Sue Woodward, Martha Van Rensselaer Hall 3M11, 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. Students in options Ia and Ib, especially, must begin early to plan and collect materials for a portfolio of their work, which is necessary for many job interviews and for application to graduate schools. Faculty advisers can recommend what material should be included. 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.

Human Development and Family Studies

The programs of the Department of Human Development and Family Studies (HDFS) combine a broad theoretical background in human development and family studies with specialization in a chosen area of interest. Courses encourage students to participate and apply their knowledge. The size and combination of the programs of instruction, public service, and research activities provide diverse opportunities for students to prepare for careers or for graduate study. University teaching and research, social work, medicine, law, and clinical psychology require graduate education. Positions such as research technicians, program assistants, personnel supervisors, youth counselors, and childcare workers may be available to graduates with the bachelor's degree. The department does not offer programs leading to teaching certification at any level.

The Curriculum

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 diversity yet ensures a common base for upper level courses in the major. Courses within the department vary from lectures and discussions to research and independent study. All students are required to participate in a laboratory or field setting.

An HDFS major also takes at least one course beyond the introductory level in each of three areas: cognitive development, personality-social development, and family and society. Courses deal with language and learning; individual, social, personality, and cognitive development; the family in its traditional and contemporary forms; and settings for human development outside the home.

People are studied at all levels and stages of life, with emphasis on the years from infancy through adolescence.

Many HDFS majors choose to specialize in specific areas within the field or in combination with other disciplines to prepare for particular careers or for graduate study. Some of these areas require graduate study in related disciplines, for example, psychology, social work, education, sociology, biology.

To help HDFS majors plan their curriculum and define career goals, written descriptions of these areas are being prepared in a booklet called *Pathways*, which will include:

- A description of the specific pathway or field.
- A list of possible vocations and the level of preparation necessary (that is, bachelor's degree or graduate work).
- A suggested list of related course work within HDFS, the College of Human Ecology, and the University.
- Suggestions for helpful resources available in the Ithaca area.

Written descriptions of five pathways are available: adolescence, childhood, family, public policy, and

social-personality development. Pathway descriptions now being written include: adults and aging, atypical development, cognitive development, and life-span development. In addition, information is being compiled on possible combinations of HDFS with other fields to prepare students for careers such as business, law, and health-related areas.

Further information is available at NG14 Martha Van Rensselaer Hall.

Honors Program

The Honors Program leading to a bachelor of science degree with honors in HDFS is designed to provide in-depth research experience for students interested in graduate school, and to challenge students who enjoy and excel in research-oriented activities. 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 may also 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 and should complete the project by the end of April. All thesis work must be completed by May when the student's oral examination is held. More information is available in the department chairperson's office, NG14 Martha Van Rensselaer Hall.

Academic Advising

Students majoring in HDFS are assigned a faculty adviser by the advising coordinator, Ann Dyckman, NG14 Martha Van Rensselaer Hall. Students are free to change their adviser as their own interests change and should see the coordinator when contemplating a change. *Consultation with a faculty adviser is strongly recommended.* 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. Student advisers and special career programs provide additional help for students.

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 may want to enter a variety of professions, including teaching home economics, social work, adult health, and community activities. HSS graduates work in schools, social agencies, cooperative extension services, and community development agencies and 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 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 the commonalities and differences of related professions 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.

Interdepartmental Major in Social Planning and Public Policy. The Department of Human Service Studies participates in the Interdepartmental Major in Social Planning and Public Policy with the Department of Consumer Economics and Housing. In this major the students acquire knowledge and skills to assess local and regional needs and to develop, implement, and evaluate policies and plans for meeting those needs, and learn to work as professionals in state and local agencies. The major is described following these departmental descriptions.

Options

Two options are available in the department: (1) community and family life education, and (2) social work.

Students who elect the option in community and family life 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 an area of adult and community education or the teaching of home economics in a school or a nonschool setting. Students who desire to teach home economics in schools (kindergarten through twelfth grade) select a sequence of courses that meet New York State certification requirements.

Students who pursue the accredited social work option are prepared for entry-level jobs in social work and are eligible to apply for a year's advanced standing in graduate schools of social work.

Option I: Community and Family Life Education

This option prepares participants to plan, implement, teach, and evaluate innovative educational programs in formal and informal settings. Students from this option may take positions in cooperative extension, schools, outreach programs (teen-age pregnancy centers, half-way houses, consumer and homemaking programs), local poverty programs, community centers, continuing education centers, and business and government agencies.

Course work combines a liberal education with professional preparation and integrates field-based learning to link theory with practice.

Building on basic courses taken early in the programs, students select an area of concentration based on their interests, background, and professional goals, that permits them to study the relationships between a particular area and individual, family, and community life. With careful planning students often are able to meet the requirements of a second major closely related to the area of concentration and thus widen their career choices.

Faculty advisers help students develop a plan for course work that may include courses from basic disciplines or other departments, tutorials, fieldwork, and research. Plans should be completed by spring course registration during the student's sophomore year.

Students who desire 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.

Students who plan an emphasis on adult and community education do not need to meet home economics teacher certification requirements, although by careful planning this may be accomplished.

Option II: Social Work

The undergraduate program in social work at Cornell has three major goals: to prepare students for positions in the field that do not require advanced degrees; to prepare students for graduate education in social work; and to contribute to the enrichment of a general college education by helping students understand social welfare needs, services, and issues.

The social-work curriculum is based on the biological and social sciences, the humanities, and three core courses in the department, HSS 202, HSS 203, and HSS 292. These requirements generally are 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.

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 within the limits of its resources. 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.

Accreditation. 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 they may seek employment as professional social workers.

Academic Advising

The curricula in HSS are demanding; each of the HSS options requires breadth and depth in several areas. The core courses (HSS 202, HSS 203, and HSS 292) must be taken in the freshman and sophomore years, and prerequisites for each of the options should be completed before the junior year, if possible. (Special provisions are made for junior transfers.) Each student must have a practicum supervised by HSS faculty that is tied directly to his or her professional preparation.

It is important for a student who is interested in majoring in human service studies to declare that major and select an option as early as possible. Once the major is declared, the departmental advising coordinator, Edythe Conway, assigns an adviser from the HSS faculty. A student who is unsure about which option to pursue should talk with a faculty adviser. With judicious planning, opportunity to change options or the major can be built into the program. When an option is changed, the student is reassigned to an appropriate adviser for that program. 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.

Nutritional Sciences

See p. 305

Social Planning and Public Policy

The legislative trend in the United States that is moving public policy development from the federal to the state and local levels emphasizes the need for trained personnel in social planning and public policy. The Interdepartmental Major in Social Planning and Public Policy is designed to meet this need. The program is sponsored jointly by the Departments of Consumer Economics and Housing and Human Service Studies.

Students increase their knowledge of (1) the historical development and the current issues in social planning and public policy; (2) the ways policies and plans are formed, implemented, evaluated, and changed; (3) social systems, from the structure and functioning of contemporary society to the dynamics of individual and group behavior; and (4) values that help foster and maintain some policies and plans rather than others.

Students electing this major have opportunities to improve their skills in policy analysis, evaluative research, developing information systems, engaging consumers in the planning and policy making process, and budgeting.

Options

Two options are available in the major; a student selects the one most suited to his or her interests and career plans and completes the necessary requirements. Either option prepares a student for graduate or professional study.

Option I: Social Planning

The option in social planning prepares students for careers in planning the organization and delivery of human services. Social planners are employed in county, regional, and state planning agencies and assist public and private health and social agencies in the design, development, and evaluation of regional and local programs.

Option II: Public Policy

This option is planned for students who are primarily interested in the evaluation of public policy alternatives, especially implications of these policies for consumers and households. Graduates may build careers as researchers or policy analysts in planning departments or other public or private agencies at the local, regional, state, or federal level in areas related to housing, welfare, income and employment, or consumer affairs.

Academic Advising

Faculty advisers whose interest and experience lie in the fields of social planning and public policy are available to counsel students on career goals and to help plan curricula. 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 Keith Bryant and Alan Hahn will be glad to answer questions about the advising system.

Individual Curriculum

Students in the college who find that none of the major curricula meet their educational objectives may want to investigate designing their own program of study. An individual curriculum must be within the focus of the college and must be better suited to a student's objectives than is an existing major. The individual program must include at least 40 credits in

human ecology courses and may not exceed the normal number of credits allowed in the endowed divisions of Cornell.

Such a program of study should encompass a substantial part of the student's undergraduate education and must include at least three semesters. For this reason, a request to follow an individual curriculum should be made as early as possible and always before the second semester of the junior year.

If objectives meet the requirements, the student should discuss plans with a counselor. If an individual curriculum seems a possibility, Barbara Morse, in the Counseling Office, will help the student formally develop a program.

Special Opportunities

Several special programs allow students to receive academic credit for fieldwork and internship experience; to study in absentia; or to enter particular graduate programs after the junior year.

Human Ecology Field Study

Field study provides opportunities for students to learn by carrying out responsibilities in placement organizations outside the University and by attending group seminars to reflect on that activity. Students are helped to develop a sophisticated framework for thinking about social systems which enables them to draw on a variety of integrated disciplines to solve human problems. This process of integrating theory and practice distinguishes field study from work experience and provides the rationale for granting field study credit.

Each department in the college offers field study opportunities within scheduled courses and through individually arranged field study courses, which emphasize professional exploration or training related to the major. The Field Study Office, 170 Martha Van Rensselaer Hall, offers interdepartmental field-related courses with an interdisciplinary problem-solving approach to social issues.

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 Africana Studies. 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 on the bulletin board outside the Office of the College Registrar. Other courses offered in these special programs may not be taken for credit unless permission is obtained through petition to the Director of Special Educational Projects.

Dual-Registration Programs

Graduate School of Business and Public Administration

A limited number of highly qualified students from Cornell undergraduate divisions, including Human

Ecology, may be accepted by the Cornell School of Business and Public Administration after their junior years. Students need the approval of the B&PA admissions office and the Director of Special Educational Projects in the College of Human Ecology. Accepted students should be aware that if the B&PA course work taken in their 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.

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 applying 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 whatever reason it deems appropriate. The program is available only during the fall and spring semesters.

For further information, contact Joyce McAllister, 146 Martha Van Rensselaer Hall.

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, 105 Day 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. In this case, all the tuition will be retained by the extramural division and none will be returned to the statutory college in which the course is offered. In special situations (such as courses offered in the biological sciences) where it is not clear whether a given course is offered by a statutory or an endowed college, it is the student's responsibility to obtain written verification from the college that the course is a statutory college course entitled to the reduced tuition rate.

Planning a Program of Study

Majors

Each department offers a major, and within most departmental majors there are specific options. The college also offers an interdepartmental major. 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 and product design, apparel design, textiles, 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): community and family life education, social work

Nutritional Sciences (NS): consumer food science, consumer food and nutrition, community nutrition, clinical nutrition, nutritional biochemistry. (By careful planning, students may also meet the minimum academic requirements of the American Dietetic Association.)

Interdepartmental Major in Social Planning and Public Policy (ID-SPPP): social planning, public policy

Individual Curriculum: It is possible to develop an individual program of study if none of the above programs fit particular educational and career objectives.

Changing Majors

Because any student's interests and goals may change as new options emerge, the college provides ways for students to change their majors. When a declared major no longer seems to meet a student's educational goals a counselor or faculty adviser may be able to point out alternatives. If the student decides to make a change, a change-of-major form (available from the Office of the College Registrar, 146 Martha Van Rensselaer Hall), ensures that the change is sent to the department in which the student wishes to major so an adviser can be assigned to the student.

Completing a Major

A summary of record is kept for each student in the Office of the College Registrar. At fall registration each continuing student receives a copy showing which major and graduation requirements have already been met. It is important to check this summary and to bring any questions to the attention of staff members in the Office of the College

Registrar. Although a student may complete the requirements of more than one major, he or she is officially certified to graduate under only one.

Electives

Students have individual objectives in choosing courses beyond the minimum requirements of the major. The University is diverse; the departments, centers, and special programs numerous; the fields of study almost unlimited. Counselors and department advisers are available to discuss which courses may interest students and round out their educations.

Students should consult the index of this Announcement for information on where different subjects are taught in the University. Some subjects are taught in more than one division of the University.

Foreign Language Study and Placement

Students who studied a foreign language before coming to Cornell and who want to continue must take either the CEEB achievement test in that language or a departmental language placement test. The latter is given during orientation week in September and again in December, January, and May. Students in human ecology who plan to work with non-English-speaking people in this country or overseas often find it necessary to be proficient in another language. For more detailed information, see the Advanced Placement of Freshmen section.

Graduation Requirements

To graduate, students need:

- 1) to meet college credit and distribution requirements,
- 2) to complete the requirements for a major,
- 3) a cumulative average of 1.7 (C-) or better,
- 4) to fulfill residency requirements, and
- 5) to 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)

- Natural sciences* (6 credits) selected from Biological Sciences 101–103, 102–104, 102–208, 105–106, 109–110; Chemistry 103–104, 207–208, 215–216; or Physics 101–102, 112, 201, 207–208. Biological sciences courses must be taken sequentially.
- Social Sciences* (6 credits) selected from economics (including CEH 110, 111, but excluding Agricultural Economics 221 and 310; psychology (including Education 110, 311, 317, and HDFS 115, 116, 117); sociology (including rural sociology, CEH 148, and HDFS 150 and 307). Do not take Economics 101 and CEH 111; Economics 102 and CEH 110; or Psychology 101 and Education 110; they are equivalent courses.
- Additional credits* (12 credits) selected from any subjects listed above or with courses in anthropology (except archaeology); Astronomy 102; biochemistry; microbiology; genetics and development; Geological Sciences 101; and government.

II. Communication, Analysis, and the Humanities (15 credits)

- Freshman Seminars* (6 credits) selected from courses listed in the Freshman Seminar brochure, which may be obtained at 260 Goldwin Smith Hall.

- 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)

- Requirements for the major* (the number of credits required varies by major and option)
- 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)

- Requirements for the major* (number of credits varies from 0 to 15 credits)
- 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, and the
- 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, and the
- Graduate School of Business and Public Administration.

Courses in the endowed divisions in this section may not exceed a total of 21 credits. If Economics 101 or 102, Psychology 101, or Soc 101 or 107 are selected to meet requirements for section I, credits in the endowed divisions allowed for Sec IV will be reduced accordingly.

V. Physical Education (2 credits)

Students who have successfully fulfilled these requirements should have completed at least 122 credits.

Related Policies

College course requirement. Effective fall 1980, 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.

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 the student's major may determine which courses the student takes to meet the requirements in these sections. If the student does not want to fulfill the requirements of Section I and Section II with courses specified by the major, then he or she may apply the courses taken for the major toward the elective requirements (Section IV, 41 credits). (Courses not listed in Sections I and II may also be used to meet the 41 credits required in Section IV.)

In Sections I, II, and III-B students are permitted to lack 1 credit toward meeting the requirements for these sections. For example, 14 instead of 15 credits of human ecology courses may have been taken

outside the major department, or 23 instead of 24 credits of courses in the natural and social sciences may have been taken; however, the minimum total of 120 credits (exclusive of physical education) must be met.

Section IV-A. *There is no limit to the number of credits that students may take in the state divisions of Cornell* and therefore, both the total number of credits taken for Section IV and the total number of credits accumulated for graduation may exceed the minimum requirements.

Section IV-A and IV-B. Elective credits earned in Cornell's endowed divisions during the summer session, credits earned in absentia, and transferred credits are counted as credits earned in the state divisions and do not count toward the maximum 21 credits that may be taken in the endowed divisions in meeting the requirements of this section.

Section IV-B. Not more than 21 credits may be taken in the endowed divisions of the University except under all of the following conditions:

- 1) Students must be in the final semester prior to graduation:
- 2) The credit taken must be in excess of the 122 credits required for graduation (for instance, a student who wants to take 23 endowed credits under this area must graduate with a total of 124 credits);
- 3) payment must be made per credit for each credit taken in excess of the 21 allowed.

Courses taken to meet requirements in Section I and II and within the limit of 21 credits in IV-B may be taken without charge except that credit for any course given in an endowed division will, in case of failure, be charged against the 21 endowed credits allowed under Section IV.

Related Policies for Transfer Students

Natural sciences. Entering transfer students who lack preparation in biology and either chemistry or physics, either at the high school or college level, must make up this deficiency before registering for their third semester in the college.

Section I-A. Transfers who have had biology and chemistry or physics in either high school or college and who are entering human ecology programs in interior and product design, 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 courses taken to meet a former institution's natural science requirements.

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 IV-B. Transferred credits for courses applied toward electives do not reduce the 21 Cornell endowed credits that students are allowed.

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. Students twenty-two years of age or older at the time of matriculation to Cornell may be exempted from physical education by the College Registrar. Exemption or postponement for medical reasons must be cleared by Gannett Clinic. For further information about exemption or postponement from physical education, consult the College Registrar, Joyce McAllister, in 146 Martha Van Rensselaer Hall.

Related Policies for Freshmen

Natural sciences. The college recommends that entering students complete a unit of biology and either a unit of chemistry or physics before they matriculate. Entering freshmen who lack a unit of biological or physical science must make up this deficiency before they register for their fourth semester. A semester-long college-level course in the appropriate science is considered equivalent to a high school unit and counts as credit toward graduation requirements.

Section V. Freshmen are required to take two semesters of physical education during their freshman year.

Residency Requirements

All college curricula are planned to fit within an eight-semester program. An average schedule of 15 credits a semester (in addition to physical education) is considered standard, and if pursued for eight semesters will provide the credits needed for graduation. If the student completes all the requirements—for the major, for distribution, for total credits, and for cumulative average—in fewer than eight semesters, the degree may be conferred at the end of the semester in which the last requirements are met. Students who plan to receive their degrees early should notify the registrar at the beginning of the semester so that their summaries of record may be prepared and their names placed on the list of degree candidates.

Sometimes a student (particularly a transfer student) may need an additional semester to complete a program. To register for a semester beyond the eighth, the student submits a written request to the Director of Special Educational Projects. The request should detail the reasons for wanting to enroll for the extra semester and include a list of courses planned for the additional semester. Such requests usually are granted when there appears to be no feasible way for the student to complete the professional curriculum or the degree requirements without the extra semester.

Freshmen entering the college with 15 transfer credits have seven semesters in which to complete the degree. Transfer students must complete at least 60 credits at Cornell.

Mature students (those at least twenty-four years old at the time of matriculation) are not required to petition the director of special educational projects for approval to study beyond the usual eight semesters.

Exemptions from Requirements

Students who want an exemption from a specific graduation or major requirement may petition the director of special educational projects. Approval may be given under certain circumstances. For example, transfer students may have problems scheduling courses to meet college distribution requirements, and the director of special educational projects may approve alternative courses. If the requirement for which the student seeks exemption is one specified by the major, the director of special educational projects will refer the petition to the department for consideration.

Petition forms are available in the counseling office, N101 Martha Van Rensselaer Hall.

Procedures

Course Enrollment

Students are expected to complete course enrollment during a designated period of time each semester. Failure to do so carries a \$10 penalty, which can be

waived only if circumstances are completely beyond your control. It is the student's responsibility to find out the dates of course enrollment.

Before or during course enrollment, talk to a department adviser or counselor or both in the Counseling Office about your program plans. Students must have their course enrollment schedule signed by their departmental faculty adviser. 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 advance 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 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. Course enrollment materials are mailed to each new student; continuing students are notified 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 registration schedule or signs the optical-mark course-enrollment form that can be obtained from the Office of the College Registrar or the Counseling Office.

Students interested in taking a course in the Department of Art in the College of Architecture, Art, and Planning are required to register with the departmental secretary before enrolling in the course. Seniors who want to take an elective course in the School of Business and Public Administration are required to obtain permission of the instructor on a course authorization form that the student then files with the school's registrar, 312 Malott Hall.

Special Studies Courses

Each department in 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 material.

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 description of the study to be pursued must be filled out. Signatures of the instructor and the department chairman 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 in more than 15 credits or five courses without special permission from the college registrar.* To receive permission, attach 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.

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 try to avoid the need to drop courses.

Except for those with mature student status, a student must carry at least 12 credits (exclusive of physical education). Students who want to carry fewer than 12 credits must petition. 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, 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 Bursar's Office, 260 Day Hall.

Mature students may carry 6 to 12 credits without petitioning. However, they still must have the college registrar sign the form for proration of tuition and fees and return the form to the Bursar's Office, 260 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 normally must 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 a counselor in the Counseling Office 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. Waiving of the fee must be handled through the college registrar. A counselor can advise students about course enrollment under these circumstances.

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 ID is 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 their summary of record from the Office of the College Registrar. The summary shows which graduation and major requirements have been completed. Students who have any questions about the summary's accuracy should see a counselor in the Counseling Office or someone in the Office of the College Registrar.

Late University Registration A student who misses registration day must pay a \$30 penalty during the first three weeks. The late registration fee is increased by \$10 each week for the fourth, fifth, and sixth weeks and \$25 for each additional week beyond. Late University registration is held during the first three weeks of the term. After the first week of classes students must also have the written permission of the college registrar before they will be allowed to register in the University. After the third week of classes, students registering late must also have the permission of the Office of the University Registrar in addition to the written permission of the college registrar and the payment of 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 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. Aside from the procedures listed below for course enrollment changes, all course change forms for nutritional science 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.

- 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 your name to the list of enrolled students for a course you are adding, and to remove your name from the class list for a course you are dropping. Ask that person to 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. Your 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 changes during the first three weeks of classes.
- 5) You will receive carbon copies of each optical-mark course change form at the time you turn them in. These copies are stamped with the date of receipt. It is important to keep these copies in case you need 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-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 you are enrolled in a Human Ecology course with a limited enrollment and you have not attended the first two class sessions, you will be dropped from the course unless circumstances have prevented you from attending class and the instructor has been notified.

After the third week and through the seventh week of the term, follow the procedure outlined above for changes made during the first three weeks of the semester, except that instructor must sign the course change form for human ecology courses, and a \$10 fee must be paid.

After the seventh week of classes, a student may not make course changes without petitioning for approval. Students should realize that they are expected to attend classes and do assigned work until the petition has been formally approved.

Study in Absentia

Under certain conditions credit toward a Cornell degree may be given for study in absentia, that is, study done at an accredited institution away from Cornell after entering the College of Human Ecology. To be eligible for credit for such study a student must

be in good academic standing and must receive permission in advance from the college registrar. Students not in good standing may study in absentia but will not receive transcript credit until they return to good standing.

In absentia petition forms are available in the Counseling Office. The petition form should be filled out and catalog descriptions attached for the courses the student wants to take, and then it should be filed in the Office of the College Registrar.

Students whose petitions are granted receive a letter giving them permission from the college registrar to study in absentia. Credit may be granted for study in absentia after the work has been done, but there is no guarantee that such credit will be awarded if permission has not been obtained in advance.

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 submit a petition to 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 in which 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 or Withdrawal

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 leave of absence or withdrawal are urged to discuss plans with a counselor. If the student decides to take a leave of absence or withdraw, a counselor will notify the Office of the College Registrar and the office will process the official forms.

Requests for leaves of absence received after the first seven weeks of the semester or requests for a leave of absence from students who have already had two semesters' leave of absence will be referred

for action to the Committee on Academic Status. The committee may grant or deny such requests, attaching conditions as it deems necessary. Leaves of absence after the first seven weeks generally are granted only when there are compelling reasons why the student is unable to complete the semester, such as extended illness.

If a leave of absence is requested after the first seven weeks, students are advised to attend classes until action is taken on their petitions. A student whose petition for a leave of absence is denied may choose to withdraw or to complete the semester.

The academic records of all students who are granted a leave of absence are subject to review, and the Committee on Academic Status may request grades and other information from faculty to determine whether the student should return under warning, severe warning, or in good academic standing.

Students who leave the college without an approved leave of absence or do not return after the leave has expired will be given a withdrawal after the seventh week of the term in which they failed to register. 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. A student who has withdrawn from the college and who wants to return at a later date must reapply through the Committee on Admissions for consideration along with all other applicants for admission.

Special Students

Students eligible for special status are those visiting from other institutions and interested in particular programs in the college; those with bachelor degrees preparing for graduate study or jobs and careers in human ecology-related fields; or those who have interrupted their educations and are considering completing degree programs. Students accepted in the non-degree status of special students 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.

Mature Students

The college recognizes that students who interrupted their formal education and are returning to school have problems different from those of the average undergraduate. To facilitate the education of mature students, defined as those twenty-four years old or older at matriculation, the college has adopted certain procedures specifically for that group.

Mature students are permitted to enroll for as few as 6 credits without petitioning. 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.

Mature students also are permitted to extend their residency beyond the normal eight terms. It is highly recommended that mature students contact Vivian Geller, the director of Continuing Education Information Center, 158 Olin Hall, for information on services available through that office.

Grades

See the Grading System section for information on the official University grading policies.

S-U Grades

Some courses in the college and in other academic units at Cornell are offered on an S-U basis; that fact is indicated in the course description. University

regulations concerning the S-U system require that a grade of S be given for work equivalent to a C- or better; for work below that level, a U must be given. No grade-point assignment is given to S, and S or U grades are not included in the computation of semester or cumulative averages. A course in which a student receives an S is, however, counted for credit. No credit is received for a U. Both the S and U grades appear on a student's record. A student who is attempting to qualify for the Dean's List must take at least 12 credits for the usual A-F grades.

Only juniors and seniors may take courses for an S-U grade in which the grade of S or U is optional; sophomores may take courses in which *only* the grade of S or U is offered. A student may take no more than four courses (or 12 credits) on an S-U basis during his or her college career; however, more than one S-U course can be taken in one semester. S-U courses may be taken only as electives or in the 15 credits required in the college outside the major unless the requirements for a specific major indicate otherwise. Freshmen enrolled in English 137 and 138 (offered for S-U grades only) are permitted to apply these courses to the Freshmen Seminar requirement.

To take a course for an S or U, a student must first make sure by checking the course description that the course is offered on that basis, then obtain the permission of the instructor and file a special S-U form with the instructor's signature and the add/drop/change form in the Office of the College Registrar before the end of the third week of the term. After the third week of the term, students must petition the college registrar to change S-U grading status. Forms are available in the Office of the College Registrar and in the Counseling Office.

Incompletes

A grade of INC (Incomplete) is given when a student does not complete the work for a course on time, but when, in the instructor's judgment, there was a valid reason. A student with such reason should discuss the matter with the instructor and request an INC. A grade of incomplete remains permanently on a student's official transcript even after the work is completed and a final grade recorded.

A student who receives an INC in a course may be permitted a maximum of two semesters and a summer in which to complete the work and receive a regular grade; if the work is not completed by that time, the INC remains on the record, and no credit is given for the course.

When a student wants to receive a grade of INC, a conference should be arranged with the instructor (preferably before classes end and the study period begins) to work out the agreement. A form, called Explanation for Reporting a Final grade of F or Incomplete, which has been signed by both the instructor and the student, must be submitted by the instructor. This form is submitted with the final grade sheets whenever an incomplete is given.

This form is for the student's protection, particularly in the event that a faculty member with whom a course is being completed leaves campus without leaving a record of the work completed in the course.

If circumstances prevent a student from being present to consult the instructor, the instructor may, if requested by the student, initiate the process by filling out and signing part of the form and turning it in to the Office of the College Registrar with the grade sheet. Before a student will be allowed to register for succeeding semesters he or she must go to the Office of the College Registrar to fill out and sign the remainder of the form.

If the work is satisfactorily completed within the required time, the course appears again on the student's official transcript, with the final grade received, for the semester in which the course was completed.

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. 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 Developmental Studies: Reading and Learning Strategies

Fall, spring, or summer. 2 credits. Enrollment limited. S-U grades only.

Fall and spring: sec. T R 11:15 or 3:35, plus two 1-hour labs to be arranged. A. Grinols.

Theoretical applied approaches to academic achievement are examined and utilized by students as they pursue personal growth goals: (1) to maximize academic reading rate and comprehension level, (2) to master efficient learning strategies. Individual conference and laboratory practice are included as course requirements.

International Education Program

P. Frazer, director

The International Education Program both prepares students for international and intercultural education, and grants credit for foreign study at approved institutions. For information about study at cooperating foreign institutions, see the director of the program.

360 Preparing for International or Intercultural Experience

Fall or spring. 2 credits. S-U grades optional. Prerequisites: two social science courses, or permission of instructor.

M 2:30–4:25. P. Frazer.

Introduces students to intercultural differences in preparation for work and study in developing nations and for work with subcultural groups in the United States. Topics will include cultural differences in motives, beliefs, and values; the transmission of culture; the relationship between culture and personality; perception; verbal and nonverbal communication; adjusting to a different culture; cultural contact and change; and human development programming in cross-cultural situations. Lectures, slides, films, and case studies provide the basis for class discussion on the many problems involved in intercultural relationships. Students receive 2 credits for the classroom component of this course; an additional 3-credit option is available if a January study tour is offered.

361 Study Abroad

Fall and spring. 6–15 credits. Prerequisites: ID 100, 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; September 15 for following spring semester.

A full semester off-campus program of courses, at least one of which includes field experience at a cooperating university in another country; designed to provide both theoretical background in factors relevant to the human ecology of the geographical area concerned and practical understanding of agencies and institutions concerned with human well-being in that environment. Presently the cooperating universities concerned are the University of Haifa, Israel, and the University of Puerto Rico.

Students must plan their program well ahead of time with the help of their academic adviser, who must approve the plan before the application is submitted to the assistant dean. An application for study abroad and list of courses at the foreign university approved for human ecology distribution requirements is available at 146 or 159 Martha Van Rensselaer Hall. Students should plan to take at least 12 credits, of which 6–9 should be in credits approved for human ecology (Groups III or IV or

both) and the balance to continue language study or to satisfy distribution requirements for graduation or both.

Program supervision is undertaken by a specially designated faculty member of the foreign university. A transcript of credits earned is sent to the college registrar. Completion of course requirements is signified by a formal presentation to the college community upon return to Cornell.

Division of Student Services

W. H. Gauger, assistant dean for student services
B. Bricker, director of admissions
C. Reed, director of special educational projects
L. Wiley, director of placement
N. Yaghlian, director of counseling
E. A. Cutter-Martire, B. Morse, R. Richardson, M. Thomas

Special studies sponsored by faculty members in the division involve such topics as counseling theory and practice in relation to various student populations, the career development process in fields related to human ecology, and the delivery of student services.

400–401–402 Special Studies for Undergraduates

Fall or spring. Credits to be arranged. S-U grades optional.

Hours to be arranged. Staff.

For independent study by an individual student in advanced work not otherwise provided in departments or for study on an experimental basis, with a group of students, in advanced work not otherwise provided in departments. Students prepare a multicopy description of the study they want to undertake on forms available from the Counseling Office. This form must be signed by the student services faculty member directing the study, the office director, and the assistant dean for student services and filed at course registration or within the change-of-registration period after registration. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the assistant dean is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study.

400 Directed Readings For study that predominantly involves library research and independent reading.

401 Empirical Research For study that predominantly involves data collection analysis or laboratory or studio projects.

402 Supervised Fieldwork For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

600 Special Problems for Graduate Students Fall or spring. Credit to be arranged. S-U grades optional. Limited to graduate students recommended by their chairperson and approved by the assistant dean for student services and the member of the staff in charge of the problem for independent, advanced work.

Hours to be arranged. Staff.

Interdepartmental Courses

Field Study Office

T. Stanton, director; D. Giles, M. Holzer, M. Whitham

100 Orientation to Field Study: Skills for Learning in the Field

Fall or spring. 2 credits.

Limited to 15 students per section. Prerequisites: permission of instructor. S-U grades optional. ID 100 can be taken concurrently with ID 402.

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, active listening, investigative interviewing, understanding nonverbal communication, identifying sources of information in the community, and analyzing verbal presentations. All of the concepts are applied to assignments in the field.

200 Preparation for Fieldwork: Perspectives in Human Ecology

Fall or spring. 4 credits. Limited to 25 students a section. Prerequisite: permission of instructor. For students interested in preparing themselves for field experience. Enrollment priority given to students of at least sophomore standing who intend to do field study the following semester.

T R 10:10–12:05 or T R 2:30–4:25. D. Giles.

Introduces students to field skills (such as interviewing, observation, public speaking, and leading discussion) and provides opportunities to practice and develop those skills. Additionally, small student task forces consider case studies highlighting complex issues at local, community, state, and national levels. Students work together to define problems, analyze and synthesize data from a variety of sources, and make group presentations.

400 Directed Readings For study that predominantly involves library research and independent reading.

401 Empirical Research For study that predominantly involves data collection and analysis.

402 Supervised Fieldwork Fall, spring, or summer. 3–15 credits. S-U grades optional for up to 12 credits. Limited to 20 students. Prerequisite or corequisite: ID 100. Enrollment by permission of instructor. Applications due in the Field Study Office during the preceding semester's course enrollment period.

Hours in the field to be arranged. Sem, M 2:30–4:25. M. Whitham.

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. Seminar focuses on an in-depth analysis of the ecology of rural organizations. Credit is variable to allow for combined departmental and interdepartmental sponsorship and supervision.

Information on placement opportunities is available in the Field Study Office, 159 Martha Van Rensselaer Hall. Students should begin planning at least a semester in advance for field study.

403 Teaching Apprenticeship For study that includes assisting faculty with instruction.

406 Sponsored Field Learning or Internships

Fall, spring, or summer. 6–15 credits. S-U grades optional for up to 12 credits. Limited to 25 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, Washington Center for Learning Alternatives, and internships arranged independently by students with individual public or private organizations or institutions. Field supervision, largely carried out through biweekly correspondence, is aimed at complementing students' work-and-study assignments while on their internships and at enabling students to gain an in-depth understanding of how their internship organization operates and the internal and external ecological forces that influence it. Completion of course requirements is signified by a formal presentation to the college community upon return to Cornell (graduating seniors may make special arrangements). Credit is variable to allow students to arrange for combined interdepartmental and departmental sponsorship and supervision.

Information on course enrollment and internship opportunities is available in the Field Study Office, 159 Martha Van Rensselaer Hall. Students should begin planning at least 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. Hours in the field to be arranged. Sem, R 1:30–4:25. 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. Deadline for receipt of applications in Field Study Office: October 8, 1981 for spring 1982; March 11, 1982 for fall 1982. M. Holzer.

A full-semester, off-campus field course in the New York City metropolitan area designed to give an in-depth understanding of how contemporary organizations operate and what forces influence the delivery of goods and human services. The course combines intensive participation in an organization that represents at least one of three perspectives (providers of goods and human services, policy makers and regulators, or community action and consumer groups) with a weekly seminar-workshop that provides the skills, concepts and theories necessary for understanding and analyzing these organizations and the critical issues they face.

ID 408 is not simply a work experience. This course provides a working learning setting that integrates academic theory, field experience, and interpersonal skills.

Information on field placements is available in 159 Martha Van Rensselaer Hall. Students should begin planning at least one full semester before they apply to ID 408.

Interdepartmental Major

See the Interdepartmental Major in Social Planning and Public Policy under the Department of Consumer Economics and Housing and the Department of Human Service Studies.

Consumer Economics and Housing Courses

J. Robinson, chairman; A. Davey, graduate faculty representative; H. B. Biesdorf, W. K. Bryant, P. Chi, S. Clemhout, M. S. Galenson, W. H. Gauger, J. Gerner, A. J. Hahn, B. Hall, R. K. Z. Heck, M. Johnson, M. Lea, E. S. Maynes, N. C. Saltford, A. Shlay, J. Swanson, E. Wiegand

110 Introduction to Consumer Economics I Fall. 3 credits. S-U grades optional. Students who have taken Economics 102 or another introductory microeconomics course should not register for this course.

Fall: M W F 10:10. M. Johnson. Principles of microeconomics with an emphasis on applications to consumers, household economics, and housing. Introduction to the concepts of opportunity cost, time as a resource, consumer demand, household production, market failure, and the impact of government regulation of the market on consumers.

111 (100) Introduction to Consumer Economics II Fall or spring. 3 credits. S-U grades optional.

Students who have taken Economics 101 or another introductory macroeconomics course should not register for this course.

Fall: M W F 1:25; M. Galenson. Spring: M W F 11:15; M. Lea.

An introductory course designed to provide a basic understanding of macroeconomics, with particular attention to those areas affecting families. The course covers national income accounting, income distribution, prices, and monetary and fiscal policy. This serves as a basis for the study of income redistribution programs and other areas of government action.

147 Housing and Society Fall. 3 credits.

Enrollment limited to 4 sections of 30 students each. S-U grades optional.

Lecs, T R 11:15; sec, T 1:25 or 3:35, W 1:25, or R 9:05. 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.

148 Sociological Perspectives on Housing

Spring. 3 credits. Enrollment limited to 6 sections of 15 students each. S-U grades optional.

Lecs, T R 10:10; secs, M 9:05 or 2:30, T 11:15, W 9:05, 10:10, or 2:30. A. Shlay.

An introductory sociology course analyzing the distribution of housing and population within urban areas. Students focus on the link this urban social and spatial structure has to the quality of urban life. Topics include urban ecology, mobility and migration patterns, suburbanization, segregation, urban social stratification, community power, crime, and poverty.

233 Marketing and the Consumer Spring.

3 credits. Prerequisite: CEH 110 or equivalent. S-U grades optional.

T R 8:30–9:55 Staff.

A study of marketing functions, institutions, policies, and practices with emphasis on how they create consumer satisfaction. A marketing project with a nearby consumer products firm and a field trip to New York City to study selected marketing operations are arranged when feasible.

300 Special Studies for Undergraduates Fall or spring. Credit 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 Decision Making Fall or spring.

3 credits. S-U grades optional. Limited to 35 students; not open to freshmen; preference given to human ecology juniors, seniors, and transfer students.

T R 12:20–2:15; Optional field trip. A. Davey.

A systems approach identifies and analyzes components of family management and decision making. The focus is on the contribution of management to the improvement in family living. The PSI format permits self-pacing.

[313 (413) Family Resource Management: An Ecological Approach] Spring. 3 credits.

Limited to 20 students; not open to freshmen; preference given to juniors and seniors. Offered alternate years. Not offered 1981–82; next offered 1982–83.

M W F 11:15–12:05. A. Davey.

An ecological approach is used to examine the resource limitations of families and to study ways to correct imbalances and develop new resources. Special attention is given to the resource problems associated with different family forms at different stages of development. Students may elect a field experience to fulfill part of the course requirements. Suggested for students preparing to work with families in social work, geriatrics, secondary and adult education, and financial counseling.]

[325 Economic Organization of the Household]

Spring. 3 credits. Prerequisite: CEH 110 or equivalent. S-U grades optional. Not offered 1981–82; next offered 1982–83.

M W F 9:05. J. Gerner.

Theories and empirical evidence about 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.]

330 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.

Fall: M W F 1:25; J. Robinson. Spring: M W F 10:10; R. Heck.

The study of personal financial management at various income levels and during different stages of the family life cycle. Topics include the use of budgets and record keeping in achieving family economic goals; the role of credit and the need for financial counseling; economic risks and available protection; and alternative forms of saving and investment.

[332 Consumer Decision Making] Spring. 3 credits. Prerequisite: CEH 110 or permission of instructor. Not offered 1981–82; next offered 1982–83.

T R 10:10–11:25. E. S. Maynes.

This course is designed to help students make more effective choices as consumers through an understanding of the economy and the use of relevant economic and statistical principles. The course is normative, stressing how consumers should act in order to achieve their goals.]

341 Fundamentals of Housing Economics

Spring. 3 credits. Prerequisites: CEH 110–111 or equivalent. S-U grades optional. Offered alternate years. Offered 1981–82; next offered 1983–84.

M W F 1:25. M. Johnson.

To give a basic understanding of the structure and operation of the housing market, the economic determinants of housing supply and demand are related to (1) levels of housing consumption and housing standards, (2) the composition of the housing inventory, and (3) levels of and fluctuations in housing production.

348 (248) Housing and Local Government Fall. 3 credits. Prerequisite: CEH 110 or equivalent. S-U grades optional.

T R 10:10–11:25. M. Johnson.

Analysis of state and local government tax, expenditure, and regulatory activities that affect the housing market. Detailed consideration will be given to property taxation, provision of local public goods, zoning, housing and building codes, and other governmental policies that deal with housing and neighborhood environment.

355 Wealth and Income Fall. 3 credits. Open to sophomores, juniors, and seniors. Graduate students may elect to audit and write a research paper for one to two credits under CEH 600. Prerequisites: CEH 110–111 or equivalent. S-U grades optional.

M W F 9:05. W. K. Bryant.

Examination of contemporary economic problems that affect the welfare of families in the United States. Examples are affluence and poverty; monetary and fiscal policies as these affect families; and efficacy of the delivery of public services in the areas of health, education, and subsidized housing. Where relevant, the historical origin of these problems will be studied.

400–401–402 Special Studies for Undergraduates

Fall or spring. Credits to be arranged. S-U grades optional.

Hours to be arranged. Staff.

For advanced, independent study by an individual student or for study on an experimental basis with a group of students in a field of CEH not otherwise provided through course work in the department or elsewhere at the University. Students prepare a multicopy description of the study they want to undertake on forms available from the Counseling Office. This form must be signed by the instructor directing the study and the department chairman and filed at course registration or within the change-of-registration period after registration. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the department chairman is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study:

400 Directed Reading For study that predominantly involves library research and independent reading.

401 Empirical Research For study that predominantly involves data collection and analysis or laboratory or studio projects.

402 Supervised Fieldwork For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

411 Time as a Human Resource Fall. 3 credits. Prerequisites: one course in sociology; one course in microeconomics recommended. S-U grades optional.

T R 8:30–9:55. 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.

[425 Economics of Recreation and Leisure]

Spring. 3 credits. Prerequisite: microeconomics. Recommended: a course in sociology. S-U grades optional. Not offered 1981–82.

T R 8–9:15. W. Gauger.

The course focuses on leisure time use and views recreational activities as consumer goods that are subject to economic decisions on the allocation of time and money. Empirical observations and data are examined for theoretical insights.]

430 The Economics of Consumer Policy Fall. 3 credits. Prerequisites: CEH 110–111, or permission of instructor.

M W F 2:30. Staff.

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.

441 Housing and Consumer Credit Finance Spring. 3 credits. Prerequisites: CEH 110–111 and CEH 147. S-U grades optional. Offered alternate years. Offered 1981–82; next offered 1983–84.

T R 10:10–11:25. R. Heck.

Examines the residential and consumer credit financing process, alternative instruments, and sources of credit. Both primary and secondary markets are discussed as well as the impact of legislation on these markets. Also examined are the implications of the financing process for consumers.

443 Sociological Aspects of the Housing Environment Fall. 3 credits. Prerequisite: CEH 147 or CEH 148. S-U grades optional.

T R 10:10–11:25. A. Shlay.

The relationship between housing and social behavior and organization is examined. Levels of analysis include (1) the physical features of housing which influence human behavior and the quality of life, (2) the housing composition of neighborhoods, the congruency between local housing and population composition, patterns of interaction, and the physical dimensions of community, (3) housing as an expression of the chronology of family life, and (4) 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.

449 Housing Policy and Housing programs Fall. 3 credits. Prerequisites: CEH 111 or equivalent and CEH 147. S-U grades optional.

T R 2:30–3:45. M. Lea.

Critical examination of the development and current condition of federal and selected state housing policies. Beginning with the rationales for governmental housing policy, the course examines the purpose of various housing programs and assesses their operation and potential for continued effective functioning. Topics include public housing, cash-based housing programs, urban renewal, and the operation of the secondary mortgage market. The applications and effects of state and federal housing policies in New York City are addressed.

465 Consumers and the Law Fall. 3 credits. Prerequisite: CEH 111 or equivalent. S-U grades optional.

T R 10:10–11:25. M. Galenson.

The operations of federal agencies and the courts in various consumer areas, including compensation for injury from defective products, deceptive advertising, the Fairness Doctrine in television and radio broadcasting, the regulation of food and pharmaceutical drugs, class actions, fraud, and the proposed consumer protection agency.

472 Community Decision Making Fall. 3 credits. Prerequisite: Government 111 or equivalent. S-U grades optional.

T R 8:30–9:55. A. Hahn.

Identification and discussion of factors that influence the outcomes of community issues. Topics include political participation, decision-making processes, the interests and resources of key decision makers, and community change. Concurrent participation in community activities is desirable but not required.

480 Welfare Economics Fall. 3 or 4 credits. Prerequisite: permission of instructor before advance course enrollment. S-U grades optional.

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 Public and Private Decision Making Spring. 3 credits. Prerequisite: an intermediate microeconomic theory course or equivalent. Offered alternate years. Offered 1981–82; next offered 1983–84.

T R 2:30–3:45. M. Lea.

This course focuses on the demand for and provision of public goods and the evaluation of government programs providing such goods. Individual demand for public goods as expressed through voting and other ways that reveal preferences is examined, as is the behavior of bureaucracies and other institutions providing public goods. Cost-benefit analysis as a tool of evaluation is discussed and programs in both the consumer and housing areas are evaluated as case studies.

600 Special Problems for Graduate Students Fall or spring. S-U grades optional.

Hours to be arranged. Staff.

Independent advanced work by graduate students recommended by their chairperson and approved by the head of the department and the instructor.

601 Seminar in Consumer Economics and Housing Fall or 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.

619 Seminar in Family Decision Making Fall. 3 credits. Prerequisites: graduate standing and some background in home or family management. S-U

grades optional. Offered alternate years. Offered 1981-82; next offered 1983-84.

M W F 11:15. A. Davey.

An in-depth study of family decision making based on the several approaches found in the literature of home or family management.

620 Community, Housing, and Local Political Processes Spring. 3 credits. S-U grades optional.

T 1:25-4:25. A. Shlay.

A seminar linking local political processes, housing, and community change. Focus is on the social costs of fiscal and physical planning and the mechanisms producing power differentials through the nexus of property ownership. Values underlying the perceived desirability of particular housing patterns and the construction and implementation of local policies are considered. The prospects and possibilities for eliminating social and spatial barriers that impede local equality are explored.

[621 Explorations In Consumer Economics

Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. Offered alternate years. Not offered 1981-82; next offered 1982-83.

Hours to be arranged. Staff.

With the guidance of the instructor, students select and investigate independently a substantive current consumer issue. The topic selected must be one that can be studied within both an economic and an institutional framework. Students present status reports to the class regularly for criticism and feedback. A term paper is required.]

626 Economics of Household Behavior I Spring. 3 credits. Prerequisite: Economics 311 or concurrent enrollment in Economics 311. S-U grades optional.

M W F 10:10. W. K. Bryant and J. Gerner.

Introduction at graduate level to theory and empirical research on household demand, consumption, savings, and market work, with implications for current policy issues. Provides introduction to more advanced treatment of market work, household production, and economics of the family presented in CEH 627.

627 Economics of Household Behavior II Fall. 3 credits. S-U grades optional. Prerequisites: Economics 311 and CEH 626.

M W F 10:10. W. K. Bryant and J. Gerner.

Further examination of theoretical and empirical literature concerning market work, household production, and family formation, as well as policies in these areas. Based on introduction provided in CEH 626.

628 Information and Regulation Spring. 3 credits. Prerequisites: CEH 626 or CEH 627.

M W F 9:05. Staff.

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.

[630 Family Financial Management Spring. 3 credits. Prerequisites: introductory statistics course and CEH 330 or equivalent. S-U grades optional. Offered alternate years. Not offered 1981-82; next offered 1982-83.

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.]

640 Fundamentals of Housing Fall. 3 credits.

Prerequisite: graduate standing or permission of instructor. S-U grades optional.

W 2:30-4:25. 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; the social and economic effects of housing regulations.

[642 Advanced Housing Market Analysis Fall.

3 credits. Prerequisite: Economics 311 or equivalent. S-U grades optional. Offered alternate years. Not offered 1981-82; next offered 1982-83.

R 2:30-5. M. Lea.

The interaction of supply and demand in the housing market studied from a spatial perspective through location theory and the development of metropolitan areas, and from a time perspective involving new construction and residential filtering. Topics studied include both theoretical and empirical location models, empirical housing demand and supply studies, optimum city size, property value and rent determination models and housing discrimination studies.]

648 Demographic Aspects of Housing Spring.

3 credits. S-U grades optional. Prerequisite: graduate standing or permission of instructor. Offered alternate years. Offered 1981-82; next offered 1983-84.

R 2:30-4:25. P. Chi.

The dynamic relationship between population and the housing market. The size and composition of the population, components of population growth, population distribution, and residential location are analyzed in light of the amount and quality of the housing stock. The course uses techniques and models for population and housing projections at both national and subnational levels.

[665 Seminar on Consumer Law Problems

Spring. 3 credits. Open to CEH graduate students and to others with permission of instructor. Enrollment limited to 20 students. S-U grades optional. Offered alternate years. Not offered 1981-82; next offered 1982-83.

T 10:10-12:05. Staff.

A study of areas of current interest to consumers involving the law as developed by regulatory commissions and the courts, with emphasis on the institutional and economic background. Encourages critical examination of policy issues and their social and economic effects on families.]

680 Applied Welfare Economics—Policy Issues

Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional.

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 or spring. Noncredit course.

M 4-5. 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 economic theory or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1981-82; next offered 1982-83.

M W 1:25-3:20. W. K. Bryant.

Major developments in the theory of household behavior with applications to consumption, saving, physical asset, debt, and liquid asset positions of households; demand and expenditure analyses; economics of consumer information; market work and housework activities of households; economics of household size and form.]

[727 Human Capital Fall. 3 credits. Prerequisite: intermediate economic theory or permission of instructor. Recommended but not required: CEH 411. S-U grades optional. Offered alternate years. Not offered 1981-82; next offered 1982-83.

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. Offered alternate years. Not offered 1981-82; next offered 1982-83.

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.]

743 Readings In Housing Spring. 2 credits.

Prerequisite: permission of instructor. S-U grades optional.

Hours for discussion of readings to be arranged. Staff.

758 Seminar for Doctoral Candidates Fall.

2 credits. S-U grades optional.

Staff.

Review of critical issues and thought in consumer economics and public policy questions.

899 Master's Thesis and Research Fall or spring.

Prerequisite: permission of the chairperson of graduate committee and the instructor. S-U grades optional.

Graduate faculty.

999 Doctoral Thesis and Research Fall or spring.

Prerequisite: permission of the chairperson of graduate committee and the instructor. S-U grades optional.

Graduate staff.

Design and Environmental Analysis Courses

W. R. Sims, Jr., chairman; M. E. Purchase, graduate faculty representative; G. Atkin, R. Barker, F. D. Becker, M. Boyd, A. Bushnell, C. N. Cawley, C. C. Chu, G. Cukierski, P. Eshelman, C. E. Garner, A. T. Lemley, W. J. McLean, L. Mankowski, G. C. Millican, S. K. Obendorf, E. R. Ostrander, A. Racine, R. Rector, G. Sloan, C. Straight, S. S. Watkins, M. W. White, C. Williams

101 Design I: Fundamentals A Fall or spring.

3 credits. Each section limited to 20 students.

Approximate cost of materials, \$50.

M W 1:25-4:25, or T R 10:10-1:10 or 1:25-4:25.

M. Boyd, C. Straight, C. Williams.

A studio course introducing the fundamental vocabulary and principles of design. Students experiment with the development of form through problem-solving approaches.

102 Design I: Fundamentals B Spring. 3 credits. Each section limited to 20 students. Prerequisite: DEA 101. Approximate cost of materials, \$35.

M W 1:25–4:25, or T R 8–11. M. Boyd, A. Bushnell, C. Straight.

A study of visual organization including problems of color and visual perception. Emphasizes the development of visual sensitivity, imagination, and problem structuring, utilizing simple materials to produce abstract solutions.

111 Theory of Design Spring. 3 credits.

Enrollment limited to 120 students; DEA majors given priority.

T R 10:10–12:05. C. Williams.

Introduction to the field of design for the student in any academic area. The course reviews the spectrum of design activities, examining various movements in the visual arts and differences among designers in philosophical premises, social and functional roles, and cultural positions. Also examined are requirements in the man-made environment as affected by the interaction of people, design, and materials. Lectures and visual material are presented by DEA faculty members and visiting design professionals.

115 Drawing Fall or spring. 3 credits. Each section limited to 25 students. Minimum cost of materials, \$15.

M W 1:25–4:25 or 7:30–10:30 p.m. P. Eshelman, C. Garner, C. Millican.

A studio drawing course. Short demonstrations or lectures on the idea and techniques of drawing are presented every week. The student is introduced to the functions of line, shape, and value as they apply to design. Drawing from the figure and from inanimate objects; perspective; and conceptual drawing are emphasized.

117 Drawing the Clothed Figure Spring. 3 credits. Enrollment limited to 25 students. Prerequisites: DEA 115 or equivalent. Priority given to DEA Option IB and II majors. S-U grades optional. Approximate cost of textbook, \$25; supplies, \$35.

M W 8–11. C. Garner.

Intended to improve the student's ability to illustrate two-dimensionally the interaction of draped fabric and the human form and to develop awareness of clothing as a design medium. Emphasis is on development of techniques and skills in selected media necessary for professional communication of design ideas.

120 Elements of House Design: Technology

Spring. 3 credits.

Hours to be arranged. L. Mankowski.

An introduction to the residential design process. A thorough analysis of the construction techniques and mechanical systems of human habitation. Topics include a historical overview of shelter and architectural styles of the 1900s, site selection and analysis, building materials, structural design, water and waste systems, electrical lighting systems, energy conservation techniques, and contemporary passive solar energy systems. The course ends with a minor design problem intended to integrate technology and the design process.

135 Textiles I Fall. 3 credits. Each lab limited to 20 students. Prerequisite or corequisite: Chemistry 103 or 207. Maximum cost of supplies and textbook, \$30.

Lecs, M W 10:10; lab, T or W 2:30–4:25. R. Barker.

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.

Each lab section in the fall limited to 25 students; spring lec and lab sections limited to 40 students. 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. Approximate cost of supplies, \$30 plus fabric for final project.

Fall: lec, T R 1:25; labs, T R 2:30–4:25. Spring: lec, M W 7:30–10:30 p.m. A. Racine.

Intensive study of principles and processes of flat pattern design and fitting techniques with emphasis on development of creative expression.

Sewing skills are not taught. For those with limited skills, an autotutorial laboratory must be scheduled concurrently or prior to enrollment. Contact the instructor. Materials for autotutorial laboratories, \$10.

150 Introduction to Human-Environment

Relations Fall. 3 credits. Required for DEA majors.

M W F 12:20–1:10. F. Becker, E. Ostrander, B. Sims, G. Sloan.

An introduction to the influence of the physical environment on human behavior. Topics include environmental influences on social behaviors such as crowding, sense of community, crime, and friendship; environmental needs associated with social characteristics such as different stages in life cycle, life styles, social class, family structures, and handicaps; basic consideration in person-environment fit such as lighting, acoustics, and thermal comfort; an introduction to human factors and systems analysis; the effects of environmental form on perception and cognition; the dynamics of collaboration; user responsive design; the participatory design process; research in programming; and postoccupancy evaluation.

201–202 Design II 201, fall; 202, spring. 6 credits a term. Each section limited to 15 students.

Prerequisites: DEA 101; DEA 115 prerequisite or corequisite with 201; DEA 102 prerequisite or corequisite with 202; or permission of instructor; recommended: DEA 111, 150. Minimum cost of materials, \$60 a semester; shop fee \$10. Additional spring fees: darkroom fee, \$10; optional field trip, approximately \$60.

M W 8–11 and T R 1:25–4:25, or M W 1:25–4:25 and T R 8–11. A. Bushnell and P. Eshelman.

A studio course emphasizing the conceptualization of form as a function of the theory and handling of materials. Included are basic drafting, model building, and presentation drawing. The course is structured around a series of design problems, three to five weeks in length, using wood, plastic, metal, glass, ceramics, concrete, and textiles. Where possible, problems include the handling of the actual materials.

230 Science for Consumers Fall. 3 credits. Each lab limited to 20 students. Not open to students who have taken DEA 434. Prerequisite: high school or college chemistry or physics. S-U grades optional.

Lecs, T R 9:05; lab, W 12:20–2:15.

Principles of science related to consumer problems, such as energy conservation in the home, electricity in dwellings, heat transfer, control of temperature, humidity, sound, and odors in dwellings, mechanics of equipment, chemistry of cleaning agents, and chemical characteristics of surfaces to be cleaned. Particularly valuable for environmental designers and analysts and students planning to work with consumers as teachers, extension workers, home service personnel, or consultants.

232 Science, Technology, and Human Needs

Spring. 3 credits. Prerequisite: high school chemistry or physics. S-U grades optional.

M W F 10:10. A. T. Lemley.

An examination of some underlying scientific principles of today's complex technology, designed to

enable students to identify, understand, and better evaluate current problems that have a basis in the physical sciences and are of concern to society. Some areas to be covered: air and water quality, computers, body chemistry, medicine and drugs, cosmetics, communications, energy, and synthetic materials. Course relates principles of the natural sciences to specific applications that affect people and their environment.

235 Textiles II Spring. 3 credits. Each lab limited to 16 students. Prerequisites: DEA 135 and 2 semesters of chemistry.

Lec, T 9:05; labs, T R 10:10–12:05 or M W 1:25–3:20. S. K. Obendorf.

A study of critical performance characteristics of textiles and the relation of these characteristics to use of textile articles. Emphasis is on comfort, durability, and special performance characteristics. Also included is study of the purposes, scope, and limitations of laboratory textile testing and the relations between laboratory testing and end-use performance.

240 Clothing Through the Life Cycle Spring. 3 credits. Not open to students who have taken DEA 445.

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.

[245 Dress: A Reflection of American Women's

Roles Fall. 3 credits. Enrollment limited to 40 students. S-U grades optional. Because the class meets only once a week, attendance at each session, especially the first, is extremely important. Not offered 1981–82.

M 7:30–10:30 p.m. A. Racine.

A historical survey of changing patterns of American women's dress from the colonial period to present day, as well as the sociocultural forces that affected women's development within the social class structure. The Cornell costume collection and illustrated lectures are used to develop an awareness of historic costume, while assigned readings focus on expected roles. Students investigate topics dealing with the impact of dress on cultural assimilation of immigrant women in America.]

250 The Environment and Social Behavior Fall. 3 credits. Prerequisite: DEA 150 or permission of instructor.

T R 2:30–4. F. Becker.

A combination seminar and lecture course for students interested in the social sciences or design. Using a series of exercises, students examine and apply the ways environmental form influences social behaviors such as aggression, cooperation, community, and crime, and how characteristics such as stage in life cycle, family structure, and social class influence environmental needs and purposes. The implications for the planning, design, and management of complex environments such as 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 furniture and interiors from man's earliest expressions through the eighteenth century 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. 3 credits. Prerequisites: DEA 145 and completion of or concurrent registration in DEA 101 and 135. Recommended: DEA 115 and 240. Apparel design majors should take DEA 264 and DEA 367 in the same academic year. Minimum cost of materials, \$40.

T R 1:25–4:25.
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.

301–302 Design III 301, fall; 302, spring. 6 credits a term. Prerequisites: DEA 201–202. DEA 302 and DEA 499 may not be taken concurrently. Minimum cost of materials, \$60 a semester.

M T W R 1:25–4:25.
A studio course emphasizing the conceptualization of form as a function of human and social factors. Environmental analysis concepts and techniques are studied to provide design students with enough understanding to begin a behaviorally based design project. Several short-term problems are explored in the fall semester. More complex problems are undertaken in the spring semester.

325 Human Factors—Ergonomics Fall. 3 credits. Recommended: DEA 150.

T R 10:10–11:30. G. Sloan.
Implications of human physical and physiological characteristics and limitations on the design of settings, products, and tasks. An introduction to engineering anthropometry, biomechanics, work physiology, and motor performance. Attention is given to the needs of special populations such as the physically handicapped.

330 Household Equipment Principles Spring. 3 credits. Prerequisites: NS 146 or DEA 135 or DEA 230. S-U grades optional.

M W 2:30–4:25. M. Purchase.
Principles of operation of appliances for food preparation and preservation, cleaning, laundering, temperature and humidity control, and lighting. Use of energy by appliances. Evaluation of features in

relation to their function and cost. Selection, use, and care of household equipment. Individual study related to the student's background and interests.

335 Textiles III: Structure and Properties Spring. 4 credits. Prerequisites: DEA 235; Physics 101, 112, or 207; and Chemistry 253 and 251, or 357–358 and 251.

Lecs, M W F 9:05; lab, T or R 1:25–4:25. C. C. Chu.
An in-depth study of the structure of textile materials and their component parts, from polymer molecules through fibers and yarns to fabrics, and the techniques of controlling structure to achieve desirable end-use properties. Emphasis is on properties important to the consumer, including easy care, elasticity, durability, comfort, and aesthetics. Laboratory experimentation illustrates the important interrelationships among structures and properties of polymers, fibers, yarns, and fabrics.

338 Textiles for Interiors and Exteriors Spring. 3 credits. Prerequisite: DEA 135 or permission of instructor. S-U grades optional.

T R 2:30–4:25. V. White.
This course reviews developments and trends in textiles for the home and for contract interiors. Consideration is given to end-use requirements, performance and test method standards and specifications, and to the environments on which these textiles are used. Field trips are arranged when feasible.

343 Design: Introductory Textile Printing Fall. 3 credits. Each section limited to 15 students. Prerequisites: DEA 101 and at least one other studio design course. Minimum cost of materials, \$50.

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, and design of surface pattern, texture, and composition for fabrics.

[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 1981–82.

M W 7:30–10:30 p.m. M. Boyd.
The fundamentals of lettering, typography, layout, and presentation techniques. Printing processes and the use of photography and illustration also are covered. Consideration is given to graphics in product and interior design, packaging, exhibit design, and informational systems.]

350 Human Factors: The Ambient Environment Spring. 3 credits. Recommended: DEA 150

M W F 12:20. G. Sloan.
An introduction to human factor considerations in lighting, acoustics, noise control, and the thermal environment. The ambient environment is viewed as a support system which should promote human efficiency, productivity, health, and safety. Attention is given to the needs of special populations such as the elderly. Emphasis is placed on the implications for planning, design, and management of settings and facilities.

351 Selected Topics in History of Costume Spring. 3 credits. S-U grades optional. Recommended: courses in history of art or cultural history.

M W 10:10–12:05.
A study of the relationship between costume and culture in selected periods of history from ancient times to the present. History is used as a resource for solving contemporary apparel needs. Lectures and class discussion are illustrated with items from the Cornell Costume Collection.

353 Historic Design III: Contemporary Design Spring. 3 credits. Prerequisite: DEA 101; corequisite: DEA 111. Recommended sequence: DEA 251, 252, and 353.

M W F 10:10. G. C. Millican.

A historical study of the emergence and development of contemporary design, 1885 to 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. 4 credits. Prerequisites: DEA 111, 115, 150, 240, and 264. Corequisites: DEA 235 and 117. Apparel design majors should take DEA 264 and DEA 367 in the same academic year. Minimum cost of materials, \$50.

T R 1:25–4:25.
A studio course covering color theory, form study, accessory work, and the use of nontraditional materials for body coverings. Development of the design process as it relates to problem solving is stressed. Problems focus on the aesthetic and functional nature of dress. The Cornell Costume Collection is used for illustration and inspiration.

400–401–402 Special Studies for Undergraduates Fall or spring. Credits to be arranged. S-U grades optional.

Hours to be arranged. Department faculty. For advanced, independent study by an individual student or for study on an experimental basis with a group of students in a field of DEA not otherwise provided through course work in the department or elsewhere at the University. Students prepare a multicopy description of the study they want to undertake on forms available from the Counseling Office. This form must be signed by the instructor directing the study and the department chairman and filed at course registration or within the change-of-registration period after registration. To ensure review before the close of the course registration or change-of-registration period early submission of the special studies form to the department chairman is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study:

400 Directed Readings For study that predominantly involves library research and independent reading.

401 Empirical Research For study that predominantly involves data collection and analysis or laboratory or studio projects.

402 Supervised Fieldwork For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

[430 The Textile and Apparel Industries Fall. 3 credits. Prerequisites: CEH 233, DEA 235, or permission of instructor. Not offered 1981–82.

M W 12:20–2:15.
A critical review of the textile and apparel industries including structure and marketing practices, and government policies that affect industry decisions and operations in such areas as energy, the environment, safety, international trade, and employee benefits and opportunities. The role of trade unions also is explored. A one-day field trip is arranged when feasible.]

[431 The Textile and Apparel Industries—Field Experiences] Second week of January intersession. 1 credit. Prerequisite or corequisite: DEA 430. S-U grades only. Offered alternate years. Not offered 1981–82; next offered 1982–83. Students are responsible for trip expenses, approximately \$175. A one-week field experience in the textile regions of the South. Students have the opportunity to see various textile processes including fiber production, knitting, weaving, dyeing and finishing, and designing. In addition, seminars with executives of each participating firm relate theory to current practice.]

[434 Care of Textiles] Fall. 2 credits. Prerequisite: DEA 235. Not open to students who have taken DEA 230. Offered alternate years. Not offered 1981–82; next offered 1982–83.

W 9:05 and F 9:05–11:00. M. Purchase.
The interaction of textiles with soils and stains, cleaning agents, and laundry equipment. Topics include characteristics of soils, mechanisms for bonding soils to substrates, textile properties and changes related to care processes, functional finishes, wet- and dry-cleaning processes, the supplies and techniques used in cleaning, and instructions for care.]

436 Textiles IV: Textile Chemistry Fall. 4 credits. Prerequisites: DEA 235; Chemistry 253 and 251 or Chemistry 357–358 and 251.

Lecs, T R 10:10; labs, T R 12:20–2:15.
K. Obendorf.
An introduction to the chemistry of the major classes of natural and man-made fibers, including their structure, properties, and reactions. Labs include the qualitative identification of textile fibers and consideration of chemical damage to fabrics, finishes, and dyes.

438 Apparel Textiles Fall. 3 credits. S-U grades optional. Prerequisites: DEA 235 and 264, or permission of instructor.

M W 2:30–4:25. Two-day field trips will be arranged when feasible. V. White.
A study of the interrelationships of aesthetics, fashion and function, and other trade-offs of concern to the consumer. Consideration of the use of standards, specifications, and other means of communication at consumer, government, industry interfaces. Individual or team projects. Seminars and lectures with required readings. Labs include evaluation of apparel.

[439 Textile Materials for Biomedical Use] Fall. 2 credits. S-U grades optional for non-DEA majors. Prerequisites: DEA 135, 235, or permission of instructor. Not offered 1981–82; next offered 1982–83.

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 also is examined.]

445 Apparel Design IV: Theory of Functional Clothing Fall. 3 credits. Prerequisite: DEA 367. It may be possible for students outside the major with sufficient background to waive the prerequisite with permission of the instructor.

M W 10:10–11:30. S. Watkins.
Application of theories of physical science to problems in clothing design. Problems require the student to relate three aspects of apparel design: needs and functions of the human body, structural properties of materials, and apparel forms. Information gained from study and testing of textiles and garment forms is applied to the problems of movement, warmth, impact protection in active sports equipment, and other topics related to comfort and function of clothing.

455 Research Methods in Human-Environment Relations Spring. 3 credits. Prerequisite: DEA 150 or permission of instructor. Recommended: a statistics course.

M W F 10:10. E. Ostrander.
The course develops the student's understanding and competence in the use of research and analytical tools to study the relationship between the physical environment and human behavior. Emphasis is placed on selection of appropriate methods for specific problems and the policy implications derived from research. Topics include unobtrusive and obtrusive data collecting tools, the processing of qualitative and quantitative data, and effective communication of empirical research findings.

459 Programming Methods in Design Spring. 3 credits.

T R 10:10–12:05. G. Sloan.
An introduction to environmental programming, with an emphasis on the formulation of system requirements that follow from user characteristics and limitations. Diverse methods for determining the characteristics required of a particular environmental setting (in order that it support the desired behaviors of its users and operators) include systems analysis, behavior circuits approach, behavior settings approach, 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.
M W 1:25–4:25. A. Racine.
Through studio problems in fashion design, students examine the influence of manufacturing technology and cost of the apparel designer. Lines of garments are developed to various stages, from sketches to finished samples.

499 Design IV Fall or Spring. 1–8 credits.

(A 4-credit senior project is required for the DEA option la major. Credits may be taken in 1 or 2 semesters. Students may elect additional credits in DEA 499, up to a total of 8 credits.) Prerequisite: DEA 301–302. DEA 302 and DEA 499 may not be taken concurrently. Minimum cost of materials, \$60.

T R 8–11. A. Bushnell, P. Eshelman, C. Williams, and department faculty.

A senior thesis (essentially a problem-solving experience): the problem area is selected by the student and faculty members.
Most projects will be within product design or interior design. However, other interests may be pursued if the department approves the proposal and if the student can find a DEA instructor who will be responsible for the program.

600 Special Problems for Graduate Students Fall or spring. Credit to be arranged. S-U grades optional.

Hours to be arranged. Department faculty.
Independent, advanced work by graduate students recommended by their chairmen and approved by the head of the department and instructor.

608 Shelter Spring. 3 credits. Undergraduates and non-DEA graduate students must have permission of the instructor. S-U grades optional.

Hours to be arranged. C. Williams.
A combination seminar and lecture course. Historical aspects of housing since World War I: structures and materials, energy constraints; construction and manufacture; cost; physical and psychological human needs; survey of housing patterns.

[621 Textile Fiber Evaluation by Modern Analytical Techniques] Spring. 3 credits.

Prerequisites: DEA 335 or 436 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1981–82; next offered 1982–83.

M W F 11:15. S. K. Obendorf.

Study of modern analytical methods, including electron spectroscopy, scanning and transmission electron microscopy, X-ray analysis, microprobes, X-ray diffraction, laser Raman spectroscopy, electron spin resonance. Evaluation of the application of these techniques in textile and polymer science. Labs on campus will be visited for demonstrations.]

630 Physical Science in the Home Fall.

2 or 3 credits (3 credits require laboratory attendance). Prerequisite: college chemistry. S-U grades optional. Consult instructor before registering.
Lecs, T R 9:05; lab, W 12:20–2:15. M. Purchase.
Applied physical science for professionals working with consumers and home appliances. Energy conservation is considered, selected principles from physics are applied to household equipment, and the chemistry of cleaning supplies and cleaning processes is studied.

635 Special Topics in Textiles Spring. 3 credits.

Prerequisite: DEA 235 and 335, or permission of instructor.
M W F 11:15. C. C. Chu.
Contemporary topics in polymers, fibers, and textiles. Emphasis on chemical, physical, mechanical properties, and environmental effects on these properties. Current research results and research trends also are discussed. Topic changes each year; consult the instructor for more information.

[636 Advanced Textile Chemistry] Spring.

4 credits. Prerequisite: DEA 436. Offered alternate years. Not offered 1981–82.
The chemistry and physicochemical properties of natural and synthetic rubbers, polyurethanes and other elastomeric materials, high-temperature polymers, and inorganic materials used as textile fibers and the relationship between their chemistry and functional properties as textile materials. Other topics will include polymerization processes, textile finishing processes, dyes and dyeing, and degradation of textile materials under environmental conditions.]

637 Seminar: Frontiers in Textiles Fall and

spring. 1 credit a term. S-U grades only. Required every semester of all graduate students in textiles. Open to advanced undergraduates who have permission of instructor.

T 4:30–5:45. V. White.
New developments, research findings, and other topics of major concern to the field of textiles are discussed by faculty members, students, and guest speakers from industry, government, and academia. Seminars are of special interest not only to graduate textile students, but to students and faculty members concerned with textile end products, such as apparel, interiors, housing, and industrial applications. Students electing to take the seminar for credit are required to write a paper in their first term, and to present a proposal for independent investigation, in the second term, and to report on their findings their third or fourth term.

639 Mechanics of Fibrous Structures Fall.

3 credits. Prerequisites: DEA 235 or equivalent or permission of instructor. Corequisite: DEA 335. Offered alternate years.

Hours to be arranged. R. Barker.
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.

648 Standards and the Quality of Life Fall.

3 credits. S-U grades optional. Limited to graduate students. Open to advanced undergraduates who have permission of instructor.

Hours to be arranged. V. White.

This course is designed to provide an awareness of the dynamic process of developing standards. What are standards? Who makes them? How do they affect the individual, the nation, business, industry, and government? Consumer product standards as a category will be considered, and both voluntary (such as ISO, ANSI, ASTM) and governmental regulatory procedures in the development of standards are reviewed. The development and use of standards are studied using case histories (for example, solar housing, apparel sizing, textile labeling, meat products, recreation safety). Lectures, discussion, and simulation of a variety of standards development activities give students opportunities to participate in the process. Consideration is given to interactions among government, industry, and consumer groups to the interfaces between voluntary and mandatory standards and between national and international standardization systems.

650 Programming Methods in Design Spring. 4 credits. Recommended: DEA 325, 350, and 455. T R 10:10–12:05, plus hour to be arranged. G. Sloan.

A course intended for the graduate student who wants a more thorough introduction to environmental programming methods than is provided by DEA 459. Each student is required to attend DEA 459 lectures, meet with the instructor and other graduate students for an additional class each week, and do additional readings and projects.

653 Psychology of Office Design Spring. 3 credits. Prerequisite: DEA 250 or permission of instructor.

M W 2:30–4:25. F. Becker.
Intended for students interested in the management and administration of organizations, as well as those interested in their design. Examination of the ways in which office design influences behaviors such as conflict, cooperation, group cohesiveness, feedback, job satisfaction, and effectiveness. The social and organizational impact of new furniture and electronic equipment systems, as well as work done in alternative settings such as the home, also is discussed. Consideration is given to social forces underlying the development of office environments, including office standards and planning processes. Emphasis is on implications for the planning, design, and management of office environments.

655 Dynamics of Collaboration in the Design Process Fall. 3 credits. Prerequisites: Elementary Psychology and DEA 250, 350, and 455.

M W F 11:15. E. Ostrander.
The role of clients, designers, users, and special consultants in working collaboratively to develop physical and social systems for living, working, and recreation. The structuring of group process to maximize effective collaboration. The procedures for collating and integrating behavioral data into formats that nonresearchers can understand as a basis for decision making. Familiarity with interaction process models that can be applied to the special problems of interdisciplinary work with the design and management professions.

656 Research Methods in Human-Environment Relations Spring. 4 credits. Letter grades only. Prerequisites: DEA 150 or permission of instructor. Recommended: a statistics course.

M W F 10:10, plus hour to be arranged. E. Ostrander.
The course develops the graduate student's understanding and competence in the use of research and analytical tools to study the relationship between the physical environment and human behavior. Students attend DEA 455 lectures, but have more extensive readings and projects and meet an additional hour each week.

659 Introduction to Facility Planning and Management Fall or spring. 1 credit. S-U grades only. Recommended every semester for graduate

students majoring and minoring in environmental analysis—human-environment relations.

DEA faculty and guests.
Seminar on current issues and content in the field of facility planning and management. Discussion by faculty members, students, and guests.

660 The Environment and Social Behavior Fall. 4 credits. Prerequisite: DEA 150 or permission of instructor.

T R 2:30–4, 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 projects 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

P. Schoggen, chairperson; H. Ricciuti, graduate faculty representative; M. Basseches, H. T. M. Bayer, W. L. Brittain, U. Bronfenbrenner, J. Brumberg, S. Ceci, M. Cochran, J. Condry, S. Cornelius, J. Doris, G. Elder, H. Feldman, J. Gebhardt, S. Gillis, S. Hamilton, J. Harding, C. Howard, E. Kain, B. Koslowski, L. C. Lee, B. Lust, P. Moen, M. Potts, R. Savin-Williams, L. Semaj, G. Suci, M. Thomas, E. Walker, S. West, P. Ziegler

111 Observation Spring. 3 credits. Not open to first-semester freshmen.

M W F 11:15. P. Schoggen.
An overview of methods of observing people and the settings in which they behave in order to (a) develop observational skills, (b) increase understanding of behavior and its development, and (c) acquaint students with basic methodological concepts underlying the scientific study of behavioral development. Direct experience in applying observational methods in laboratory and real-life settings is emphasized. Discussion groups accompany the observation experience.

115 Human Development: Infancy and Childhood Fall. 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. Special emphasis is given to the social implications of existing knowledge.

116 Human Development: Adolescence and Youth Spring. 4 credits. S-U grades optional.

Lecs, M W 1:25; R sec to be arranged.
R. Savin-Williams and 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 also is considered. Familial, peer group, educational, and work contexts for development are discussed.

117 Human Development: Adult Development and Aging Spring. 3 credits. S-U grades optional. M W F 2:30. S. Cornelius.

Provides a general introduction to theories and research in adult development and aging. Psychological, social, and biological changes from youth through late adulthood are discussed. Both individual development within generations and differences among generations are emphasized.

141 Introduction to Expressive Materials Spring. 3 credits. Limited to 18 freshmen and sophomores. T R 2:30–4:25. W. L. Brittain.

Designed to explore the means and materials suitable for creative expression for children of different ages, as well as for adults. Students are expected to acquire competence in evaluating and utilizing various media and understanding the creative process. Experimentation in paint, clay, chalk, crayon, paper, wire, plaster, wood, and other materials.

150 The Family in Modern Society Fall. 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.

[212 Early Adolescence] Fall. 3 credits.

Prerequisite: HDFS 116. Strongly recommended: a course in biology. S-U grades optional. Not offered 1981–82.

T R 12:20–2:15. R. Savin-Williams.
Examines the period of the life course during which the biological changes of pubescence occur. The impact of these changes on individual behavior, interpersonal relations with peers and family, the relationship of the individual to society, and individual psychological development in general are explored. The course places heavy emphasis on writing skills (several five-page papers) and critical thinking (critiques of published research).]

218 From Adolescence to Adulthood: Developmental Issues Fall. 3 credits. Prerequisite: HDFS 116. S-U grades optional. Offered alternate years.

T R 2:30–3:45. M. Basseches.
Explores effects on individual and society when many people well beyond puberty are not yet granted full adult status or do not assume typical adult roles and responsibilities (for example, students, transients, people experimenting with alternative life-styles). Considers both the unique developmental potentials and the stresses of youth associated with questioning of what it means and what it takes to become a full member of adult society. Intimacy, vocational choice, life-style choice, religious and political commitment, moral judgment, intellectual functioning and orientation, self-concept, and authority and dependence relations are treated as developmental and stressful issues of this period, and several of these are examined in depth.

242 Participation with Groups of Children in the Early Years Fall and spring. 4 credits (3 credits with permission of instructor). Limited to 20 students (limit depends on availability of placements and of supervision). Prerequisite: HDFS 115.

Recommended: HDFS 111. 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, and Head Start programs.

243 Participation with Groups of Children Ages Six through Twelve Spring. 4 credits (3 credits with permission of instructor). Limited to 20 students (limit depends on availability of placements). Prerequisite: HDFS 115. S-U grades optional.

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 (also Women's Studies and Sociology 238) Historical Development of Women as Professionals, 1800–1980 Fall. 3 credits. S-U grades optional. Human ecology students must register for HDFS 258.

T R 2:30–4. J. Brumberg. The historical evolution of the female professions in America, including midwifery, nursing, teaching, librarianship, prostitution, home economics, and social work. Consideration of history of women in medicine and law as well. Lectures, reading, and discussion are geared to identifying the cultural patterns that fostered the conception of gender-specific work, and the particular historical circumstances that created these different work opportunities. The evolution of "professionalism" and the consequences of professionalism for women, family structure, and American society is also discussed.

270 Atypical Development Spring. 3 credits. Prerequisites: HDFS 115, Psychology 101, or Education 110.

M W F 9:05. S. Ceci. An introduction to the psychology and education of exceptional individuals. Attention is given to the etiology and characteristics of major types of exceptionality, including learning disorders, intellectual giftedness, creativity, perceptual impairments, and the bicultural individual.

300 Special Studies for Undergraduates Fall or spring. Credit to be arranged.

Hours to be arranged. Department faculty. Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a multicopy description of the study they want to undertake on forms available from the Counseling Office. The form, signed by both the instructor directing the study and the head of the department, is filed at course registration or during the change-of-registration period.

[302 Family and Community Health Fall or spring. 3 credits. S-U grades optional. Not offered 1981–82.

T R 1:25; sec 1, T 2:30, or sec 2, R 2:30. Staff. This introduction to health science focuses on research and knowledge related to personal, family, and community responsibility for healthful living, disease prevention, and the environmental problems that affect the quality of health throughout the life cycle. Substantive material includes physical, mental, and emotional functioning, chemical alteration of behavior, family health, personal health care, and health in society. Discussion sections deal with decision making and application of theory in health science.]

[307 (also Sociology 307) Collective Behavior and Social Movements Fall. 4 credits. Prerequisite: a course in sociology or another social science. Human ecology students must register for HDFS 307. Not offered 1981–82.

T R 2:30–4. G. Elder. An inquiry into social behavior that breaks with institutionalized or conventional forms, such as acting crowds, riots, social movements, and revolution. Analysis of antecedent conditions, emergent forms, processes, and consequences. Historical and contemporary studies are covered.]

313 Problematic Behavior in Adolescence Spring. 3 credits. Prerequisites: HDFS 116 and one other course on adolescence. Students interested in adding related field experience should register concurrently for HDFS 410 or 411. Offered alternate years.

M W F 1:25. Staff. Focuses primarily on juvenile delinquency and other problems of adolescence such as drug abuse, alcohol, pregnancy, suicide, and other social and personal issues.

315 Human Sexuality: A Psychosocial Perspective Fall and spring. 3 credits. Limited to 500 students. Prerequisites: an introductory course in HDFS, psychology, or sociology (or an equivalent social science course), plus one course in biology. S-U grades optional.

T R 1:25; sec to be arranged. The aim of this course is to delineate the major psychological and sociological components of human sexual attitudes and behavior. Two central themes are addressed: the development of sexual orientation over the life cycle and the evolution of sexual norms and customs within changing social systems. An underlying issue is the role of moral assumptions and contemporary ethics in generating research and theory on human sexuality in the social sciences. Materials are drawn from interdisciplinary sources including biology, history, and anthropology.

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.

T R 12:20–1:35. S. West. Examines the theoretical and philosophical bases and specific implementation of a wide variety of programs (i.e., Montessori, behavioral, Piaget, Bank Street Model). Students are encouraged to develop their own positions in regard to values and psychological theories. Applications of various approaches to programs for children and families with special needs also are studied.

344 Infant Behavior and Development Spring. 3 credits. Prerequisite: HDFS 115 or equivalent.

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 111 and 115.

W 7–9 p.m. Staff. The role and meaning of play in the lives of children ages two through seven. Seminar discussions integrate the theoretical literature on play with practical application in a variety of early childhood settings. Special emphasis on ways to facilitate play experiences through the structuring of the environment and the use of materials and equipment. Students explore and construct early childhood materials in workshops.

[347 (also NS 347) Human Growth and Development: Biological and Social Psychological Considerations Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent; HDFS 115 or Psychology 101; and NS 115 or equivalent. Not offered 1981–82.

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 Specialized Participation in Preschool Settings Fall and spring. 3 credits. Limited to 10 students. Prerequisites: HDFS 242 and permission of instructor. Prerequisite or corequisite: HDFS 346.

Two half days and an hour staff meeting each week; hours to be arranged. Staff. An advanced supervised fieldwork experience at the Cornell Nursery School. Designed for students who have mastered basic guidance skills with preschool children. The focus is on developing more refined teaching techniques with learning materials.

352 Contemporary Family Forms in the United States Spring. 3 credits. S-U grades optional.

R 2–4:25 plus case study. L. Semaj. Variations in family formation, organization, and functioning are investigated with an emphasis on research findings about each of the family types. Family forms range from the rural communal to the more contemporary urban family. The functions of each family form are considered as they apply to the individual, the family, and to the society.

354 The Family in Cross-cultural Perspective Spring. 3 credits. Prerequisites: HDFS 115 or 116, Psychology 101 or Education 110, and HDFS 150 or Rural Sociology 100, or equivalent. S-U grades optional.

M W F 10:10. E. Kain. The sociological study of families from a comparative perspective, looking at similarities and differences across cultures and across ethnic groups. A major focus is on the interdependence of the family system and social institutions.

358 Theories of Adult Interpersonal Relationships Fall. 3 credits. S-U grades optional.

R 2–4:25. H. Feldman. Selective theories of the basic disciplines in social psychology, sociology, and psychology are reviewed and their pertinence to understanding of adulthood examined. Students generate hypotheses about these theories and test one of them through either a library or empirical paper. A journal is kept to interrelate the concepts and to suggest practical applications.

359 (also Sociology 359 and Women's Studies 357) American Families in Historical Perspective Spring. 3 credits. S-U grades optional. Prerequisites: HDFS 150 or one 200-level social science or history course. Human ecology students must register for HDFS 359.

T R 2:30–4. J. Brumberg.

This course provides an introduction 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 past time, 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 Fall. 3 credits. Prerequisites: HDFS 115 or Psychology 101, plus one other course in HDFS or psychology. Not offered 1981–82.

M W F 10:10. 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 10:10. 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 Fall. 3 credits. Prerequisites: HDFS 115, 116, and 270 or equivalent.

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 Spring. 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 Intellectual Deviations in Development Fall. 3 credits. Prerequisites: HDFS 115 and a course about personality. Not offered 1981–82.

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 in America Spring. 2 credits. Prerequisite: one social science course.

M W 9:05. J. Harding.
This course is a general introduction to social gerontology in America. Some attention is given to biological and psychological aspects of aging and considerable attention is paid to such problems as occupational retirement, bereavement, and the

decline of physical health. The course also surveys social planning for the elderly and the provision of special medical, economic, and social services.

[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. Not offered 1981–82.

T R 10:10–11:40; lab to be arranged.
L. C. Lee.
A study of experimental methodology in research with children. Includes lectures, discussions, and practicum experiences covering general experimental design, statistics, and styles and strategies of working with children.]

398 Junior Honors Seminar Spring. 1–3 credits. Permission of the director of the honors program required for registration. Limited to students in the honors program.

Hours to be arranged. Staff.
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 multipoint 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.

410 Field Experience in Adolescent Development: The Individual in Community Settings Fall. 1–9 credits. Prerequisite: permission of instructor.

M 7:30 p.m. C. Howard.
Designed to give students experience in various settings (such as social, legal, educational, and helping agencies) working with typical and atypical adolescents. 410 focuses on the individual in community settings while 411 examines social policy toward youth.

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 HDFS 414, a skills training course or equivalent experience, and permission of instructor. S-U grades optional.

Lec, M 7:30 p.m., plus field study, C. Howard.
See description above.

414 Policies and Programs for Adolescents Spring. 3 credits. Prerequisites: HDFS 116, and HDFS 212 or 218, or permission of the 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 1981–82.

M 7:30. M. Basseches.
Explores the usefulness of developmental theory as a basis for enhancing understanding of the nature and meaning of work for both adolescents and adults. In exploring the workplace as a context for human development, the course addresses itself to problems of vocational training and counseling, of workplace reorganization, and of improving the quality of working life.]

431 Learning in Children Fall. 4 credits. Prerequisite: HDFS 115 or equivalent.

W 12:20–2:15; field experience to be individually arranged. M. Potts.
Consideration of the theoretical and research literature in processes of learning. Includes the interrelations of learning and development, and learning and intelligence; examines theories and models of learning, as well as variables that affect the learning process. Application is made to the assessment of cognitive and social learning through laboratory and fieldwork.

[432 Intellectual Development and Education Spring. 3 credits. Prerequisite: HDFS 115 or equivalent. Not offered 1981–82.

T R 2:30. M. Potts.
This course defines basic cognitive processes that underlie education (e.g., linguistic processes that underlie language comprehension and production; numerical processes that underlie mathematics; reasoning processes that underlie logical inference, classification, and seriation); and review 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.

Lecc, M W F 1:25–2:15. B. Lust.
This introduction to Piaget's theory of intellectual development is intended to provide students with a basic and critical knowledge of Piaget's theory of intelligence. The course reviews Geneva research on object permanence, the development of logic, number, classification, and seriation, and formal operations of scientific thinking. Research on representation, through mental imagery and language, for example, are also discussed, as are current attempts to extend Piagetian theory to educational practice. Related research in these areas also is considered briefly.

[436 (also Psychology 436) Language Development Spring. 4 credits. Prerequisites: at least one course in developmental psychology, cognitive psychology, cognitive development, or

linguistics. Recommended: a course in linguistics. Not offered 1981–82.

T R 10:10–12:05. B. Lust.

A survey of basic literature in language development. Major theoretical positions in the field are considered in the light of studies in first language acquisition of phonology, syntax, and semantics from infancy on. The acquisition of communication systems in nonhuman species such as chimpanzees are addressed, but major emphasis is on the child. The fundamental issue of relationships between language and cognition also are discussed.]

437 Creative Expression and Child Growth Fall. 4 credits. Limited to 25 students.

T R 10:10–11:30. Saturday mornings should be free to provide time for participation with children. 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.

441 The Development of the Black Child Fall. 4 credits. Limited to juniors, seniors, graduate students, and students who have permission of the instructor. Prerequisite: HDFS 115 or equivalent. S-U grades optional.

T R 12:20–2:15. L. Semaj.

This course provides: (a) comprehensive understanding of the development of black children independent of the comparative or deficit models; (b) a critical evaluation of theories and methods which have been used in the past; (c) an introduction to proactive ways of conceptualizing the development of black children in the United States, the Caribbean, and Africa within a cultural context. Topics include physiological, psychomotor, and cognitive development; intelligence; language; personal and extended identity; and alternative models for socialization.

451 Innovative Programs of Parent Intervention and Community Action Spring. 3 credits. Limited to 10 students. Permission of the instructor required before course enrollment.

T 2:30–4:25. Additional laboratory and field experiences to be individually arranged. H. Bayer. Emphasis on the theoretical bases and the empirical consequences of programs intended to change styles of parental behavior, whether by manipulation of individual action or of societal alternatives. Consideration of parent intervention and social action.

456 Families and Social Policy Fall. 3–4 credits. Prerequisite: one course in the area of the family or in sociology. S-U grades optional.

T R 10:10–11:40. P. Moen.

An examination of the intended and unintended family consequences of governmental policies using case studies in areas such as social welfare, day care, and employment. The policy implications of changes in the structure and composition of families are also considered.

[470 Field Experience in Atypical Development] Fall. 1–3 credits. Limited to students concurrently registered in HDFS 371 or 372. S-U grades only. Not offered 1981–82. Staff.]

483 Development in Context 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.

M W F 11:15. 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.

490 Historical Roots of Modern Psychology

Spring. 4 credits. Prerequisites: 3 courses in the behavioral sciences or permission of instructor. Students who are registered in a college offering this course must register for the course through their own college.

M W F 12:20–1:10. Staff.

A survey of the major historical antecedents of contemporary psychology, including the philosophical tradition (from Aristotle through the Enlightenment), the medical-therapeutic tradition, and the rise of modern science and experimental psychology. Scholars from throughout the University give presentations in their own specialties. Students do concentrated work in their own areas of interest.

499 Senior Honors Thesis Fall or spring. Credit to be arranged. Prerequisite: permission of thesis adviser and director of honors program. S-U grades optional.

Department faculty.

Topics Courses

Fall or spring. 2–4 credits. Prerequisites and enrollment limits vary with topic being considered in any particular term. Permission of the instructor required.

Hours to be arranged. Department faculty.

This series of courses provides an opportunity for advanced undergraduates to explore an issue, theme, or body of research in the areas of departmental concentration. Topics vary each time the course is offered. Descriptions are available at the time of course registration. Although the courses are usually taught as seminars, a subject may occasionally lend itself to lecture, practicum, or other format.

415 Topics in Adolescent Development

435 Topics in Cognitive Development

455 Topics in Early Childhood Education and Development

455 Topics in Family Studies

465 Topics in Social and Personality Development

475 Topics in Atypical Development

485 Topics in the Ecology of Human Development

The Graduate Program

Human development and family studies graduate courses are open to undergraduates only with instructor's permission.

Methodology Courses

601 Research Design and Methodology Spring. 3 credits.

T R 10:10–12:05. Staff.

The seminar consists of three components: (1) discussion of representative literature on problems of research design, methodology, and data collection; (2) analysis of methodological issues involved in empirical studies employing different kinds of research designs and methods, both in laboratory and field settings; and (3) a practicum in which students formulate research designs for their own problems, to be evaluated and criticized at each stage of development and pretesting.

[602 Research Design and Data Analysis] Fall. 3 credits. Prerequisite: HDFS 601. Not offered 1981–82.

Hours to be arranged. Department faculty.

Students carry out research projects designed in HDFS 601. While working with individual faculty members on these projects, the seminar meets as a group to review and criticize progress reports of each

other's research. The seminar also discusses, through appropriate literature, problems involved in data analysis, interpretation, explanation, causal imputation, and writing research findings in publishable form.]

General Courses

[603 Development in Context] Fall. 3 credits. Not offered 1981–82.

T R 2:30–4:25. U. Bronfenbrenner.

This seminar examines issues of theory, substance, and research design related to human development in the actual contexts in which people live. Emphasis is placed on the interaction of processes (biological, psychological, and social) and social systems in the course of development in a variety of settings. The seminar is recommended for graduate students entering the field.]

617 Adolescence Fall. 3 credits.

W 1:25–4:25. M. Basseches.

Critical examination of some seminal theoretical writings on adolescent development, along with recent work relevant to intellectual development, ego development, and social development during late adolescence. Three approaches to human development that have stressed the importance of adolescence—psychoanalysis, structural developmental theory, and critical social theory—are interrelated. Empirical research on specific questions chosen by students is considered in the light of these approaches.

631 Cognitive Development Spring. 3 credits.

T R 2:30–4. B. Koslowski.

Overview of current research and theoretical issues in cognitive development with special emphasis on the sorts of areas relevant to real world (as opposed to laboratory) behavior and on the sorts of cognitive phenomena that can be detected by human observers (rather than phenomena that can be detected only with the aid of technical equipment).

640 Infancy Fall. 3 credits.

R 10:10–12:35. H. Ricciuti.

Critical review of major issues of contemporary concern in the field of infant behavior and development, based on readings of selected research papers and review articles. The overall intent is to develop an analytic understanding of where the field stands at present with respect to various topical issues and to identify directions for future research.

[641 Early Childhood Education] Fall. 3 credits. Not offered 1981–82.

M 12:20–2:15. 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; secs, M W 10:10. E. Kain.

The uses of sociological theories and research in the study of the family are studied with particular reference to the relationship between the family and society and between the family and its individual members.

660 Personality and Socialization Fall. 3 credits.

W 2:30–4:25. J. Condry.

Major issues in personality development and socialization, with special emphasis on theoretical models and empirical issues.

670 Atypical Development Fall. 3 credits.

Prerequisites: undergraduate course in abnormal psychology or psychopathology.

W 1:25–4:25. E. Walker.

Overview of current theories and empirical research on functional and organically based psychological disorders. Topic areas to be covered include autism, schizophrenia, neuroses, and personality disorders. Focus is on developmental aspects of abnormal behavior.

686 (also Sociology 658) History and the Life

Course Spring. 3 credits. S-U grades optional. Enrollment limited to 15. Prerequisites: permission of instructor. Human ecology students must register for HDFS 686.

An introduction to the life course as a theoretical orientation, methodology, and field of study. Special emphasis is devoted to multidisciplinary convergence on life-course problems, to theory and research on the interaction of social, psychological, and biological processes from birth to death; and to historical influences.

691 Research Practicum in the Ecology of

Human Development Fall and spring. 3–4 credits. Open to graduate students and upperclass students by permission of the instructor.

Hours to be arranged. U. Bronfenbrenner, M. Cochran, W. Cross.

Students have the opportunity to participate in various phases of an ongoing five-nation study on the impact of family support systems on family function and the development of the child.

Topical Seminars

Seminars, offered irregularly, with changing topics and instructors. Content, hours, credit, and instructors to be announced. Seminars offer concentrated study of specific theoretical and research issues.

618 Seminar in Adolescence Topics include peer relations, parent-teen relationships, self-esteem, youth and history, work, and moral development.

633 Seminar on Language Development Topics include acquisition of meaning in infancy, precursors of language in early infancy, and atypical language development.

635 Seminar in Cognitive Development Topics include early attention, perception, memory, and communication. Assessment and intervention in relation to these processes will be considered when possible.

645 Seminar on Infancy Topics covered in depth include the role of emotions in early development, infant stimulation and early experience, and the assessment of infant developmental competencies.

646 Seminar in Early Childhood Education

Topics include analysis of models and settings, design of assessment techniques, program evaluation, and early childhood in a cross-cultural context.

655 Seminar in Family Studies Topics include the sociology of marital status, the single-parent family, work-family linkages, women and work, and families and social change.

665 Seminar in Personality and Social Development Focuses on selected issues related to personality and social development. The issues selected vary each year according to current importance in the field and student interests.

675 Seminar in Atypical Development Topics include learning disabilities, therapeutic interventions in atypical development, child abuse and maltreatment, and family factors in the etiology of functional disorders.

685 Seminar in Human Development and Family Studies Topics include development of self-concept, sex-role identity, observational methods, and interviews in developmental research.

690 Seminar on Ecology of Human

Development Topics include the institutional setting as a determinant of behavior, the poor family, and the identification and measurement of ecological variables.

Individualized Special Instruction**700–706 Special Studies for Graduate Students**

Fall or spring. Credits and hours to be arranged. S-U grades at discretion of instructor.

Department faculty. Independent, advanced work by graduate students recommended by their special committee chairman with approval of the instructor.

700 Directed Readings For study that predominantly involves library research and independent study.

701 Empirical Research For study that predominantly involves collection and analysis of research data.

702 Practicum For study that predominantly involves field experience in community settings.

703 Teaching Assistantship For students assisting faculty with instruction. Does not apply to work for which students receive financial compensation.

704 Research Assistantship For students assisting faculty with research. Does not apply to work for which students receive financial compensation.

705 Extension Assistantship For students assisting faculty with extension activities. Does not apply to work for which students receive financial compensation.

706 Supervised Teaching For advanced students who assume major responsibility for teaching a course. Supervision by a faculty member is required.

899 Master's Thesis and Research Fall or spring. Credit to be arranged. S-U grades only. Prerequisite: permission of thesis adviser. Department graduate faculty.

999 Doctoral Thesis and Research Fall or spring. Credit to be arranged. S-U grades only. Prerequisite: permission of thesis adviser. Department graduate faculty.

Human Services Studies Courses

I. Lazar, chairman; M. Minot, graduate faculty representative; J. Allen, R. J. Babcock, D. J. Barr, H. Burris, E. Conway, A. Davey, D. Deshler, J. L. Ford, A. Hahn, C. C. McClintock, B. J. Mueller, L. A. Noble, C. Reed, C. Shapiro, L. Street, D. Tobias, B. L. Yerka, M. Zober, J. Ziegler

202 Structure of Community Services Fall or spring. 3 credits. M W F 9:05. D. Deshler.

A lecture and discussion course designed as an introduction to the community base of services. The presence or absence of educational, social, and planning services, as well as their place and performance, are examined in the context of theoretical and empirical community dimensions. Examples of such dimensions include community complexity, differentiation, modernity, ethnicity, and community role.

203 Groups and Organizations Fall or spring. 3 credits.

M W F 10:10. R. 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 2:30–3:45. D. Ritchie.

Biological, psychological, and social determinants of human behavior presented from the perspective of social-work practice. Social role analysis, with emphasis on coping, mastery, and conflict resolution. A life-span perspective on individual and family developmental tasks, with emphasis on human diversity.

292 Research Design and Analysis Fall or spring. 3 credits. Limited to 50 students. Prerequisite: a basic course in psychology or sociology.

T R 2:30–3:45. W. Trochim, H. Nelson.

Students should develop skill in analyzing and evaluating research reports. Readings and periodic assignments and exercises focus on stating hypotheses, designing studies to test hypotheses, measuring variables, and interpreting findings. The major project is a research paper that is critiqued before the final draft is submitted.

300 Special Studies for Undergraduates Fall or spring. Credit to be arranged.

Hours to be arranged. Department faculty. Special arrangement for course work to establish equivalency for training in a previous major or institution. Students prepare a multicopy description of the study they want to undertake on forms available from the Counseling Office. This form, signed by both the instructor directing the study and the head of the department, should be filed at course registration or during the change-of-registration period.

325 Health-Care Services and the Consumer

Spring. 3 credits. S-U grades optional. Limited to 40 juniors and seniors.

Hours to be arranged. A. Eggleston. Developments in the health field that affect the availability and kinds of health services. Emphasis is placed on interrelationships between institutions and agencies and the part each can play in prevention, diagnosis, and treatment of disease and disability.

330 Ecology and Epidemiology of Health Fall. 3 credits. S-U grades optional.

Hours to be arranged. A. Eggleston. Ecological and epidemiological approaches to the problems of achieving human health within the physical, social, and mental environment. The course introduces epidemiological methods to the student and surveys the epidemiology of specific diseases.

339 Ecological Approach to Instructional

Strategies Fall or spring. 3 credits. Should be taken after or concurrently with Educational Psychology.

T R 12:20–2:15. A. McLennan.

This laboratory course provides theoretical frameworks for observation, analysis, and practice of various teaching behaviors and their effects on learners. Similarities and differences in teaching youths and adults are explored and the influence of the setting 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 is arranged.

340 Clinical Analysis of Teaching

Fall or spring. 1 credit. HSS majors in Option I have priority. Open only to students who entered the program before fall 1980. Permission of instructor required.

T 12:20–2:15 plus additional hours to be arranged. Staff.

A laboratory course that provides students with theoretical frameworks for observation, analysis, and practice of various teaching behaviors and their effects on learners. Course content includes analysis of verbal and nonverbal behaviors, patterns of verbal interaction, motivational techniques and planning and teaching for cognitive, affective, and psychomotor learning. Opportunity for observation, practice, self-evaluation, and improvement of various skills and strategies is provided in microteaching laboratories where students teach brief lessons to small groups in various community settings.

370 Social Welfare as a Social Institution Fall. 3 credits. Limited to HSS social-work students or those who have permission of instructor. 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 Special Studies for Undergraduates Fall or spring. Credit 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.

411 Introduction to Adult Education Fall or spring. 3 credits. Limited to 45 students. Preference given to HSS majors. S-U grades optional.
T R 10:10-12:05. H. Burris.

Focuses on the broad aspects of adult education, scope and history of adult education programs, philosophy and principles, perspective of the adult learner, media and methods of instruction, and program development. Opportunities are provided for observation of adult education programs in community organizations and agencies.

[413 The Adult Learner in Microperspective] Fall. 3 credits. Not offered 1981-82; next offered 1982-83.
This research course examines a full range of adult learning activities by conducting in-depth interviews

with selected adult learners. The interests, motivations, needs, and special problems of adult learners are considered in relationship to adult learning theory. Skills in conducting interviews, analyzing qualitative data, and in presenting findings are developed.]

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.

415 The Adult Learner in Macroperspective Fall. 3 credits.
W 7:30-10:30 p.m. D. Deshler.

Focuses on the variety of adult education programs in countries around the world. Literature on comparative adult education, international conferences on adult education, UNESCO adult education publications, and international community development are analyzed in relationship to each student's exploration of adult education in a single country. Description of adult education in other countries is shared by international students.

[416 The Helping Relationship] Fall. 3 credits. Each section limited to 20 students. S-U grades optional.

T 10:10-12:05; R 10:10-12:05; R 2:30-4:25.
D. Barr.
The first half of the course concentrates on theory, research, and experimental exercises in interpersonal relationships. The second half focuses on ecological aspects of the helping relationship. The course is designed on the assumption that feelings and ideas can and should be taught together.]

439 Program Planning in Community and Family Life Education Spring. 3 credits.
M W F 9:05. M. Minot.

Students analyze factors that influence program planning and change and apply principles of program development to plan for and with groups or individuals in programs with different purposes and organizational structures. Plans should reflect a knowledge of clients; issues in the problem area; regulatory and legislative constraints; the philosophy of the specific program, organization, and of education; the psychology of learning; inter- and intra-organizational structures and cooperation; human and fiscal resources; and evaluation planning.

440 Program Planning Spring. 2 credits. Open only to students who entered the program before fall 1980. Prerequisite: permission of instructor. Teaching majors in Option I should schedule this course prior to HSS 441-442.

T R 8; students must save a block of approximately three hours (between 9 a.m. and 3 p.m.) during the week for observing or participating in educational programs, unless the program meets in the evening. M. Minot.

The student analyzes the factors that influence program planning and change and apply principles of program development to planning for a group or individuals in programs with different purposes and organizational structures. Plans should reflect a knowledge of clients, societal trends, issues in the problem area, the philosophy of the specific program and of education, the psychology of learning, and organizational structures. Plans are critiqued by a panel of professionals.

441 The Art of Teaching Fall; weeks 1-7. 2 credits. Prerequisites: HSS 340 and HSS 440. To be taken concurrently with HSS 442 and HSS 443. May involve some expense for field visits.

T R 10:10-12:05; plus additional hours arranged during the week of independent study following student teaching. E. Conway.

An orientation for the student teaching practicum. Major topics interrelated are: classroom atmosphere, discipline, and management; evaluation of the teaching-learning processes in relation to personal goals and unit objectives; philosophy, creativity, and teaching techniques; professionalism. Selected materials for the student teaching practicum are developed.

442 Teaching Internship Fall; student teaching full-time weeks 8-14. 6 credits. Prerequisite: HSS 440. To be taken concurrently with HSS 441 and HSS 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, E. Conway, A. McLennan.
Guided student teaching experience with student assigned to cooperating public schools. Student teachers are required to live in the school communities and work under the guidance of local teachers and department faculty. Cooperating schools are located in different types of communities, represent a variety of organizational structures, and have comprehensive programs. Students should indicate their intent as early as possible to facilitate communication and scheduling.

443 Critical Issues in Education Fall; weeks 1-7. 2 credits. Limited to 25 students; priority given to HSS Option I students. No students are admitted to the class after the first session. S-U grades optional except for HSS Option I students.

F 12:20-2:15. R. Babcock.
An examination of current issues in education. Analysis of historical, philosophical, social, and political factors that affect these issues.

444 Career Environmental and Individual Development Spring; weeks 1-7. 2 credits. Limited to 25 students. S-U grades optional. No students are admitted to the class after the first session.

F 12:20-2:15. R. Babcock.
An analysis of how work, jobs, and careers relate to and shape the behavior of individuals. Topics include theories of occupational choice, job satisfaction, structure of the labor force, manpower projection, and career planning. The course provides opportunities for students to examine their own vocational aspirations. Emphasis is on how the helping professional deals with clients or students in preparing for, adjusting to, and maintaining jobs and careers.

446 Teaching for Reading Competence: A Content Area Approach Fall. 2 or 3 credits. S-U grades optional.

M 7:30-9:30 p.m. 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 (1) the need for improvement in reading, (2) evaluation of reading materials, (3) teaching of reading skills basic to various content areas, and (4) 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 provided by the student.

452 Advanced Field Experience in Community and Family Life Education Spring. 2-6 credits. Enrollment limited by availability of field placements. Prerequisites vary depending on the field placement;

however, one of the following is required: HSS 339, 411, 446, 439, or 471-472; 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 design and implement or assess an educational program within the framework of the referring agency, government, or business setting. Some examples of projects undertaken are: teaching parenting skills to handicapped adults, developing preschool programs, teaching nutrition through school lunch programs, implementing and evaluating programs for the elderly, developing educational materials for specific organizations, working with Cooperative Extension programs, working with handicapped students, working with social service agencies. The seminar assists students in synthesizing and integrating field experience with theory.

471-472 Social Work Practice I and II

Introduction to concepts and methods used in a generalist task-centered model of social work practice. Examination of the values and ethics of professional practice. Microcounseling skills are taught using role playing and video feedback. Class content is integrated with concurrent supervised fieldwork. Placements are made in social agencies in Tompkins, Tioga, Chemung, Cortland, Broome, and Schuyler counties. Students are encouraged to provide their own transportation, but car pools will be arranged for those who cannot. The department reimburses transportation costs when funds are available, but students may have to pay their own expenses. Each student must have a current driver's license.

471 Social Work Practice I Fall. 9 credits. Limited to 25 social work students. Prerequisites: introductory psychology, introductory sociology, one course in human development, grades of C+ or better in HSS 246 and HSS 370, and permission of instructor before registration.

Lecs, M W 10:10-12:05; fieldwork, T R for 8 hours.
Sec 1, C. Shapiro; sec 2, J. Ang.

472 Social Work Practice II Spring. 9 credits.

Limited to 25 social work students. Prerequisite: grade of B- or better in HSS 471.

M W 10:10-12:05; fieldwork, T R for 8 hours. Sec 1, C. Shapiro; sec 2, J. Ang.

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. J. Mueller and staff. 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. Preference given to social work students. Prerequisite: permission of instructor before course registration. Social work students should take this course concurrently with HSS 471.

M W 3:35-4:50. Staff.

This seminar is coordinated with HSS 471, Social Work Practice I, and teaches program development in the fields in which students have their placements.

475 Social Policy Spring. 3 credits. Prerequisites:

HSS 370 or Government 111 or Sociology 141. S-U grades optional. Students should have field or work experience in a human service program before or while taking this course.

M W F 9:05. J. Allen.

An examination of the policymaking 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.

[601 Introduction to Human Service Studies Fall. 3 credits. Not offered 1981-82; next offered 1982-83.

Hours to be arranged. Staff.

The major topics dealt with, though not necessarily in a set order, are: program evaluation and evaluative research, program planning and development, and higher education in human services. Emphasis is placed on current viewpoints and related lines of research in each topic area, and particularly in interrelationships among the areas.]

650 Teaching Human Services in Higher Education

Fall. 3 credits. S-U grades optional.

M W 11:15 plus 1 hour to be arranged. M. Minot.

Basic strategies for planning and implementing instruction in human services in higher education. 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 or 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. D. Deshler.

Provides a survey of theories of adult development. Forces affecting the various periods, stages, passages, life tasks, or roles related to the adult's life cycle are examined. Biological factors, interpersonal relationships, social and cultural influences, and historical events are examined in relationship to perspectives on adult development. Opportunity for an empirical investigation of an adult population is provided. Implications from theories and student-collected data are examined in relationship to the provision of human services programs.

652 Preparing Professionals in the Human Services

Spring. 3 credits. S-U grades optional.

M W F 11:15. M. Minot.

The student analyzes the assumptions and concepts that underlie preprofessional and continuing professional education for volunteers, paraprofessionals, and professionals in the human services (for example, adult and continuing education, health, home economics, and social work education). A variety of preservice and in-service programs will be analyzed in terms of goals, means of implementation, and evaluation. Factors that influence programs are examined, including educational setting, licensure, accreditation, legislation, evaluation of performance. Students have opportunities to participate in educational programs in human service professions and community education. Students may develop or modify a model for providing professional education at the preservice or in-service levels.

653 Consulting and Supervisory Roles in Human Services

Fall. 3 credits. S-U grades optional.

W 1:25-4:25. C. Shapiro.

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

Fall. 3 credits. S-U grades optional. Not offered 1981-82; next offered 1982-83.

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 12:20-1:35. J. Allen.

A review of public policy process in education, health, and social welfare services as it pertains to program development. The course includes (1) the history, definitions, and boundaries of the policy process, (2) the relationships of the policy process to political economy, social structure, intergovernmental relations, and cultural values and beliefs, (3) theories of planning and program development in human services, (4) the role of evaluation in program planning and implementation with special emphasis on monitoring and feedback of effects into the policy and planning process, (5) 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, problems and prospects in the coordination among the various human services.

661 Designing and Implementing Human Service Programs

Spring. 3 credits. S-U grades optional.

M 2:30-4:30; W 2:30-3:30. I. Lazar.

A review of issues in the translation of research, resources, and policy in education, health, and social welfare services into programs for service to communities and individuals. The course includes issues in need analysis, organizational structure, staffing, budget preparation, fund raising, and community auspice development, as well as internally based program evaluation, administration, and change in the context of design and implementation.

664 The Intergovernmental System and Human Service Program Planning

Fall. 3 credits. S-U grades optional.

T R 3:35-5. A. Hahn, 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. H. Nelson.

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, 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.

T R 2:30–3:45. C. Shapiro.

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, and development of a research proposal.

692–693 Program Evaluation in Theory and Practice 692, fall; 693, spring. 6 credits.

Prerequisites for 692: HSS 690 and 691, or permission of instructor. Prerequisite for 693: 692. Students must register for both semesters.

T 9:05–12:05. W. Trochim.

A two-semester practicum in which the class 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 skills 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). Metaevaluation is a theme throughout and is applied in two ways: (1) an examination of the costs of the evaluation, relationship of costs to data quality, and decision making on allocation of resources among the various facets of the evaluation process; (2) a review of alternatives to primary evaluation with an emphasis on methods for secondary analysis of existing data. The discussion of secondary analysis includes attention to designs for aggregating data versus findings; acquiring, documenting, and manipulating data sets; and the development of program evaluation archives.

695 Strategies for Policy and Program

Evaluation Fall. 3 credits. Prerequisites: HSS 690 and 694 or equivalent. Not offered 1981–82; next offered 1982–83.

This course examines methods of analysis that are designed to influence policy and program decisions. Cases that are reviewed represent quantitative and qualitative research, historical research, cost accounting and administrative review strategies, peer review, adversary proceedings, and legislative analysis. Perspectives for understanding the pros and cons of each approach are drawn from the following topics: history of the interdependence of social science and public policy, influence of various institutional settings on the performance of policy and program analysis, and research on the use and impact of policy and program analysis.]

696 Qualitative Methods for Program Evaluation Spring. 3 credits. Prerequisites: HSS 690 and 694 or equivalent.

M W F 10:10. L. Street.

This course explores the issues related to qualitative research methodology and the evaluation of human service programs. Topics include the underlying epistemological assumptions, questions of entry into setting, data collection, data analysis, confidentiality of participants, and the ethics of qualitative research approaches. It is the aim of the course to delineate those settings and researchable questions where such a methodology is or is not appropriate, as well as the benefits and limitations inherent in employing it.

704–705 Internship in Human Service Studies Fall, spring or summer. 1–15 credits. S-U grades optional.

Hours to be arranged. Graduate faculty.

Internship placement in human services is determined by availability and students' academic and professional goals. Opportunities are available in public and private human service organizations at the national, state, and local level in positions consistent with student needs and desires. The duration of an internship is negotiated between the student and the agency, while course credit and residence units are arranged between the student and the special committee.

[790 Seminar in Evaluation Spring. 3 credits. S-U grades optional. Not offered 1981–82; next offered 1982–83.

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 design and measurement concerns. 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, corrections.

613 Seminar in Health and Mental Health

Services Topics include alcohol and drug problems, developments in health and mental health policy and planning, community mental health services.

658 Practicum in Higher Education in Human

Services Activities include college teaching, in-service education, and other efforts related to the preparation of professionals in the human services.

659 Seminar in Higher Education in Human

Services Topics include professional versus agency belief systems, teacher education, developments in higher education in the human services. Two or more human services are examined.

668 Practicum in Program Planning and

Development Activities include preparing plans, organizational change, developing resources and community support.

669 Seminar in Program Planning and

Development Topics include microlevel program planning, third sector organizations, 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. Variable credit. 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, 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 Fall.

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 Fall. 3 credits. Registration through the Division of Extramural Courses only.

Hours to be arranged. P. Grote.

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.

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
- Barker, Roger L., Ph.D., Clemson U. Asst. Prof., Design and Environmental Analysis
- 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. Prof., Consumer Economics and Housing
- Blackwell, Sara E., Ph.D., U. of Minnesota. Prof., Human Service Studies
- Boegly, Carolyn, M.S., U. of Wisconsin. Assoc. Prof., Cooperative Extension
- Boyd, D. Michael, B.A., U. of North Iowa. Assoc. Prof., Design and Environmental Analysis
- Brittain, W. Lambert, Ed.D., Penn State U. Prof., Human Development and Family Studies
- Bronfenbrenner, Urie, Ph.D., U. of Michigan. Jacob Gould Schurman Professor, Human Development and Family Studies
- Brumberg, Joan J., Ph.D., U. of Virginia. Asst. Prof., Human Development and Family Studies
- Bryant, W. Keith, Ph.D., Michigan State U. Prof., Consumer Economics and Housing
- Burris, Helen W., Ph.D., Iowa State U. Asst. Prof., Human Service Studies
- Bushnell, Allen R., M.F.A., Cranbrook Acad. of Art. Assoc. Prof., Design and Environmental Analysis
- Cawley, Charles, Ph.D., U. of Texas at Dallas. Asst. Prof., Design and Environmental Analysis
- Ceci, Stephen J., Ph.D., U. of Exeter (England). Asst. Prof., Human Development and Family Studies
- Chi, Peter S., Ph.D., Brown U. Assoc. Prof., Consumer Economics and Housing
- Chu, Chih-Chang, Ph.D., Florida State U. Asst. Prof., Design and Environmental Analysis
- Clemhout, Simone, Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Consumer Economics and Housing
- Cochran, Moncrieff M., Ph.D., U. of Michigan. Assoc. Prof., Human Development and Family Studies
- Condry, John C., Jr., Ph.D., U. of California at Los Angeles. Assoc. Prof., Human Development and Family Studies
- Cornelius, Steven W., Ph.D., Pennsylvania State U., Asst. Prof. Human Development and Family Studies
- Davey, Alice J., Ph.D., Michigan State U. Assoc. Prof., Consumer Economics and Housing
- Deshler, John D., Ed.D., U. of California at Los Angeles. Asst. Prof., Human Service Studies
- Doris, John L., Ph.D., Yale U. Prof., Human Development and Family Studies
- Elder, Glenn H., Ph.D., U. of Chicago. Prof., Human Development and Family Studies
- Eshelman, Paul E., M.F.A., U. of Illinois. Asst. Prof., Design and Environmental Analysis
- Ford, John L., Ph.D., U. of Michigan. Asst. Prof., Human Service Studies
- Galenson, Marjorie, Ph.D., U. of California at Berkeley. Assoc. Prof., Consumer Economics and Housing
- Garner, Clark E., M.F.A., U. of Kansas. Assoc. Prof., Design and Environmental Analysis
- Gerner, Jennifer L., Ph.D., U. of Wisconsin. Assoc. Prof., Consumer Economics and Housing
- Hahn, Alan J., Ph.D., Indiana U. Assoc. Prof., Human Service Studies
- Hall, Bruce F., Ph.D., U. of California at Berkeley. Asst. Prof., Consumer Economics and Housing
- Hamilton, Stephen F., Ed.D., Harvard U. Asst. Prof., Human Development and Family Studies
- Harding, John S., Ph.D., Harvard U. Prof., Human Development and Family Studies
- Heck, Ramona, Ph.D., Purdue U. Asst. Prof., Consumer Economics and Housing
- Johnson, Michael S., Ph.D., U. of North Carolina. Asst. Prof., Consumer Economics and Housing
- Kain, Edward L., Ph.D., U. of North Carolina. Asst. Prof., Human Development and Family Studies
- Koslowski, Barbara, Ed.D., Harvard U. Assoc. Prof., Human Development and Family Studies
- Lazar, Irving, Ph.D., Columbia U. Prof., Human Service Studies
- Lea, Michael J., Ph.D., U. of North Carolina. Asst. Prof., Consumer Economics and Housing
- Lee, Lee C., Ph.D., Ohio State U. Assoc. Prof., Human Development and Family Studies
- Lemley, Ann T., Ph.D., Cornell U. Asst. Prof., Design and Environmental Analysis
- Lust, Barbara C., Ph.D., City U. of New York. Asst. 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, Ph.D., Cornell U. Prof., Human Service Studies
- Moen, Phyllis, Ph.D., U. of Minnesota. Asst. Prof., Human Development and Family Studies
- Mueller-Lazar, B. Jeanne, Ph.D., U. of Wisconsin. Prof., Human Service Studies
- Nelson, Helen Y., Ph.D., U. of Minnesota. Prof., Human Service Studies
- Noble, Lucinda A., Ph.D., U. of North Carolina. Prof., Human Service Studies
- Obendorf, Sharon, Ph.D., Cornell U. Assoc. Prof., Design and Environmental Analysis
- Ostrander, Edward R., Ph.D., U. of Illinois. Assoc. Prof., Design and Environmental Analysis
- Potts, Marion, Ph.D., Penn State U. Assoc. Prof., Human Development and Family Studies
- Purchase, Mary E., Ph.D., Iowa State U. Prof., Design and Environmental Analysis
- Riccuiti, Henry N., Ph.D., Fordham U. Prof., Human Development and Family Studies
- Saltford, Nancy C., Ph.D., Purdue U. Assoc. Prof., Design and Environmental Analysis
- Samson, Ethel W., M.A., Columbia U. Assoc. Prof., Cooperative Extension
- Savin-Williams, Richard C., Ph.D., U. of Chicago. Asst. Prof., Human Development and Family Studies
- Schoggen, Phil, Ph.D., U. of Kansas. Prof., Human Development and Family Studies
- Semaj, Leahcim T., Ph.D., Rutgers U. Asst. Prof., Human Development and Family Studies
- Shapiro, Constance H., Ph.D., Cornell U. Asst. Prof., Human Service Studies
- Shlay, Anne B., Ph.D., U. of Massachusetts. Asst. Prof., Consumer Economics and Housing
- Sims, William R., Ph.D., Massachusetts Inst. of Technology. Prof., Design and Environmental Analysis
- Sloan, Gary D., Ph.D., North Carolina State U. Asst. Prof., Design and Environmental Analysis
- Straight, Clara J., M.F.A., U. of Colorado. Prof., Design and Environmental Analysis
- Street, Lloyd C., Ph.D., U. of California at Berkeley. Assoc. Prof., Human Service Studies
- Suci, George J., Ph.D., U. of Illinois. Prof., Human Development and Family Studies
- Trochim, William M. K., Ph.D., Northwestern U. Asst. Prof., Human Service Studies
- Walker, Elaine, Ph.D., U. of Missouri. Asst. Prof., Human Development and Family Studies
- Watkins, Susan M., M.S., Pennsylvania State U. Assoc. Prof., Design and Environmental Analysis
- White, M. Vivian, Ph.D., U. of Leeds. Assoc. Prof., Design and Environmental Analysis
- Wiegand, Elizabeth, Ph.D., Cornell U. Prof., Consumer Economics and Housing
- Williams, Christopher G., Ph.D., Union Grad. School, Antioch. Assoc. Prof., Design and Environmental Analysis
- Yerka, Bettie L., Ph.D., Syracuse U. Assoc. Prof., Human Service Studies
- Ziegler, Jerome M., M.A., U. of Chicago. Prof., Human Service Studies
- Zober, Mark, Ph.D., Brandeis U. Asst. Prof., Human Service Studies

Independent Interdisciplinary Centers and Programs

Africana Studies and Research Center

For information about the programs and courses offered by the center, see page 182.

Faculty Roster

Agyeman, Opoku, Ph.D., York U. Asst. Prof. Africana Studies and Research Center
 Cross, William E., Ph.D., Princeton U. Asst. Prof., Africana Studies and Research Center
 Harris, Robert L., Ph.D., Northwestern U. Asst. Prof., Africana Studies and Research Center
 Marable, Manning, Ph.D., U. of Maryland. Assoc. Prof., Africana Studies and Research Center
 Mbata, J. Congress, U.E.D., U. of South Africa. Assoc. Prof., Africana Studies and Research Center
 Turner, James E., Ph.D., Union Grad. Sch. at Antioch Coll. Assoc. Prof., Africana Studies and Research Center

Center for International Studies

M. J. Esman, director

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

Area Programs

China-Japan Program (140 Uris Hall).
 Committee on Soviet Studies (140A Uris Hall).

Latin American Studies Program (190 Uris Hall).

South Asian Program (130 Uris Hall).
 Southeast Asia Program (120 Uris Hall).

Problem-Oriented Programs

International Population Program (372 Uris Hall)
 Participation and Labor-Managed Systems (490 Uris Hall)
 Peace Studies Program (180 Uris Hall)
 Rural Development Committee (170C Uris Hall)
 Western Societies Program (130C Uris Hall)

Professional School Programs

International Agriculture (261 Roberts Hall)
 International Business and Public Administration (526 Malott Hall)
 International and Comparative Labor Relations (294 Ives Hall)
 International Education Program (N227 Martha Van Rensselaer Hall)
 International Legal Studies (404 Myron Taylor Hall)
 International Nutrition (127 Savage Hall)
 International 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. From seven to nine seminars, taught exclusively by Cornell faculty, are offered each term. Typical courses include: Foreign Policy and American Politics; The Planning Function in Government; The Politics of Social Welfare; The International Politics of Energy; Social, Political, and Economic Influences on the Development of Washington; Policy Research as a Policy Tool; Families and Social Policy; The Public Regulation of Economic Activity.

Most students also enroll in the seminar, Projects in Public Policy, which involves a major research study carried out through an internship in a Congressional office, interest group, lobby, or executive agency.

All courses carry appropriate credit to be used toward fulfilling major, distribution, and other academic requirements. Special programs are conducted in architecture and industrial and labor relations.

Further information concerning courses and other features of the program may be obtained from the Cornell-in-Washington office at 105 McGraw Hall (telephone 256-6205).

Program on Science, Technology, and Society

The Program on Science, Technology, and Society (STS) is an interdisciplinary unit that promotes teaching and research on the interaction of science and technology with political and social institutions. The program draws its students, faculty, and research staff from departments in all colleges of the University. Topics of special concern include science, technology, and public policy; biology and society; technology assessment; citizen participation in technical decision making; arms control and national defense policies; energy policy; environmental law and ethics; and biomedical ethics.

STS courses are normally cosponsored by University academic departments. A list of courses is on p. 189. Further information on courses and the STS Program, as well as a list of STS-related courses offered throughout the University and information concerning individualized courses of study, can be obtained from the program office, 632 Clark Hall (256-3810).

New York State School of Industrial and Labor Relations

Administration

Charles M. Rehmus, dean
 Lois S. Gray, associate dean, extension and public affairs
 Robert E. Doherty, associate dean, academic affairs
 Frank B. Miller, director, Office of Resident Instruction
 Shirley Harper, librarian
 Ronald G. Ehrenberg, director, research
 Frances Benson, director, publications
 George M. Calvert, director of budget
 Robert Aronson, graduate field representative
 Donald E. Cullen, editor, *Industrial and Labor Relations Review*

Degree Program

Industrial and Labor Relations

Degree
 B.S.

The School

The School of Industrial and Labor Relations at Cornell 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 Industrial and Labor Relations students and faculty to interact. At the same time, students are members of the larger Cornell community and participate in its programs.

Almost half of the school's typical freshman class comes from the greater New York City area. Another 30 percent live in other parts of New York State. Students from other states and a few from foreign countries make up the rest of the class. Enrollment of women has been increasing in recent years, and the current ratio of men to women in the school is about three to two.

Students enrolled in the School of Industrial and Labor Relations at Cornell may take a substantial number of courses in the other six undergraduate colleges and schools of the University, including the College of Arts and Sciences. Cornell students have access to all of the libraries and other University facilities.

The school operates in four areas: (1) undergraduate and graduate resident instruction, (2) extension and public service, (3) research, and (4) publications. It provides instruction to young people on campus who are preparing for careers in the field, as well as to men and women already engaged in industrial relations activities and the general public through its Extension and Public Service Division.

The school's Conference Center, part of the extension division, initiates and hosts conferences covering the full scope of industrial and labor relations. The center provides continuing education and information to practitioners and scholars.

The Research Division develops materials for resident and extension teaching and originates studies in industrial and labor relations. The Publications Division publishes and distributes the research results.

Departments of Instruction

Courses in the school are organized into six departments:

Collective Bargaining, Labor Law, and Labor History studies the history of the labor movement and collective bargaining in the United States, as well as the role of government in labor relations.

Economic and Social Statistics includes the principles of statistical reasoning, statistical methods, and the application of statistical tools of analysis.

International and Comparative Labor Relations is concerned with industrial and labor relations developments in other countries, both industrialized and less developed.

Labor Economics deals with analysis of the labor force, labor markets, wages and related terms of employment, income distribution, unemployment, health and safety in industry, and retirement.

Organizational Behavior investigates human behavior in organizations through psychology and sociology. Courses treat individual human behavior, organizations in society, and industrial society.

Personnel and Human Resource Studies examines the efforts of work organizations to recruit, train, compensate, and manage their members as well as with public policy and programs concerning employability, employment, and income of workers.

A full list of required and elective courses is available from the Office of Resident Instruction, 101 Ives Hall.

Resident Instruction

This division conducts the on-campus programs leading to the degrees of Bachelor of Science, Master of Industrial and Labor Relations, Master of Science, and Doctor of Philosophy from Cornell.

Office of Resident Instruction

Staff members from the Office of Resident Instruction, 101 Ives Hall, work closely with faculty and faculty committees to administer degree programs for the school. The office's responsibilities include the admitting and orienting of new students, maintaining students' personal and academic records, administering the faculty advisory system and academic standards, counseling students on personal and academic problems, and administering the school's financial aid programs. The office also provides a career counseling service and works closely with seniors who are planning graduate study.

Counseling and Advising

As entering freshmen, students will be assigned a counselor in the Office of Resident Instruction for orientation, academic advising, and counseling throughout the first year. (Transfer students are assigned counselors only for their first term.)

At the end of the first year (or term), each student will be assigned a faculty adviser. All teaching faculty members serve as advisers, and students' preferences for advisers are followed whenever possible.

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 *Guide for Candidates* which accompanies each undergraduate application or will be sent upon request by the Office of Admissions.

Study Options

Several study options are open to ILR undergraduates, making it possible to tailor a program to fit specific needs.

One such option is the five-year ILR master's degree. With early planning, some students may earn the M.S. degree in the fifth year. Using another option, some ILR students arrange for dual registration in Cornell's Graduate School of Business and Public Administration (B&PA), earning their bachelor's degree in ILR and a master's degree in B&PA after five years of study.

Some students elect to spend a semester in New York City, Albany, or Washington, D.C. with a chance to observe actual labor problem solving, or as much as a year of study at a foreign university. Others opt for internships that give them practical field experience, such as a summer in New York City's Office of Collective Bargaining or a term doing research for the New York State Senate Committee on Labor in Albany.

For more information, see "Special Academic Programs," which follows the next section.

A number of ILR courses deal directly with today's problems and involve fieldwork in the Ithaca area, elsewhere in New York State, and even in foreign countries. These courses take some students to the state legislature in Albany or to community action groups. Others may work in prisons, institutions, or school districts.

The ILR program allows juniors and seniors who want to conduct their own research to receive course credit for individually directed studies, if the program is supervised by a faculty member.

Study in Absentia

Students who want to study at another institution for a semester or for a year and receive credit toward their undergraduate degree may petition to study in absentia. This permits students to study at a foreign university or at another American school that offers a program unavailable at Cornell. Eligibility requires good standing and approval of study plans by the Director of Resident Instruction. Course work taken in absentia is usually not evaluated for transfer credit until the work has been completed and the student has returned to the school. Students then submit a course syllabus and other evidence of content to the chairman of the department that might have offered the respective course, or to a counselor in the Office of Resident Instruction if the course is more appropriate as an elective.

Leave of Absence or Withdrawal

If a student desires to withdraw or to take a leave of absence from the University, an interview should be scheduled with a counselor in the Office of Resident Instruction. Counselors will assist students in petitioning for a leave of absence.

Requirements for Graduation

To earn the Cornell Bachelor of Science degree in industrial and labor relations, the student needs to successfully complete 120 credits. Normally, this requires eight terms, although some students finish their studies in a shorter time.

Required Courses

(51 credits)

The current curriculum prescribes the courses and subjects listed in the table below to be taken in the terms indicated during the freshman, sophomore, and junior years. In the senior year, all courses will be electives.

Required Courses

Course or Subject	Credits	Term
Freshman year		
Freshman Seminars*	6	Fall and spring
Econ 101–102, Introductory Economics*	6	Fall and spring
Psych 101, Introduction to Psychology*	3	Fall
I&LR 100–101, History of Industrial Relations in the United States	6	Fall and spring
I&LR 140, Development of Economic Institutions	3	Spring
I&LR 120–121, Society, Industry, and the Individual I and II	6	Fall and spring
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 210–211, Statistics	6	Fall and spring
I&LR 200, Collective Bargaining	3	Spring†
I&LR 260, Personnel Management	3	Fall or spring
Junior year		
I&LR 340, Economic Security	3	Fall

Elective Courses

(69 credits)

From the courses offered by the school, students must select a minimum of 30 credits of ILR elective courses. No more than 9 of these 30 credits may be satisfied by I&LR 499, Directed Studies, or ILR 498, Internships, or ILR 495, Honors Program.

The remaining 39 credits may be selected from the courses of any other college at Cornell, but a student who takes more than 33 credits in the endowed colleges (the College of Architecture, Art, and Planning; the College of Arts and Sciences; the Graduate School of Business and Public Administration; the College of Engineering; and the School of Hotel Administration) will be billed for the additional tuition at the current cost per credit.

The number of credits that may be taken in the endowed colleges at no additional cost to the student may be changed at any time by official action of the school.

Recommended Courses Offered by the College of Arts and Sciences

Government. Government III, American Government and Politics, is a prerequisite to most other courses offered by the Department of Government. It is strongly recommended as an elective, preferably in the sophomore year.

Mathematics. Students considering graduate work in any of the social sciences are strongly urged to take appropriate courses in mathematics, such as calculus (Mathematics 111–112 or Mathematics 107–108).

Schedule Changes

Occasionally it may be necessary for a student to request changes in his or her course schedule either before a term begins or during the semester. Such requests must be directed to the Office of Resident Instruction in order to avoid possible loss of academic credit or failing grade.

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 occasionally may be granted in advance of the expected absence by the Office of Resident Instruction. An approved absence may be warranted by:

- 1) participation in authorized University activities, such as athletic events, dramatic productions, or debates;
- 2) medical problems supported by record of clinic or infirmary treatment;
- 3) serious illness or death in immediate family;
- 4) other circumstances beyond the student's control.

A request for approval of an absence should, when possible, be made to the Office of Resident Instruction *before the date of expected absence*. A reported and approved explanation of absence does not relieve a student from fulfillment of academic requirements during the period of absence. The course instructor has the authority to determine what work must be completed. The office can only confirm the explanation for absence. Students should inform the Office of Resident Instruction of any problems they have meeting course requirements.

Academic Standing and Grades

Academic Integrity

In 1977 the faculty of the School of Industrial and Labor Relations approved a revised code of academic integrity. This code, while based on the Cornell University code, varies somewhat. Copies are available from the Office of Resident Instruction, 101 Ives Hall.

Dean's List

A Dean's List is compiled for each of the four undergraduate classes each semester on the seventh day following receipt of final grades from the Registrar. To be eligible for the Dean's List a student must meet *all* of the following criteria as of that date:

- 1) have a semester average of 3.2 or better and rank in the top 20 percent of the class;
- 2) have a minimum of 12 letter-graded credits for the semester;
- 3) have completed all courses registered for at the beginning of the semester;
- 4) have satisfied all requirements for good standing.

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 in which a student fails to maintain good standing or if overall academic performance is so marginal as to endanger the possibility of meeting school and University degree requirements, his or her record is reviewed by the Committee on Academic Standards and Scholarships. The committee may issue a written warning to the student at that time.

Involuntary Separation from the School for Academic Reasons

A student may be denied permission to reregister at the end of any term when he or she has failed:

- 1) to establish good standing after a semester on warning;
- 2) to maintain an average of 1.7 in any term after a previous record of warning;
- 3) to achieve good standing after being on warning any two previous semesters;
- 4) two or more courses in one term or has a term average of 1.0 or below.

The Academic Standards and Scholarship Committee may decide to permit a student to remain on warning more than one semester if there has been significant improvement even though the cumulative average is still below 1.7.

S-U Grading Policy

An undergraduate may register to receive a final grade of S (Satisfactory) or U (Unsatisfactory) in courses that offer this option—either in the school or in other divisions of the University—subject to the following conditions.

- 1) The S-U option may be used in ILR and in out-of-college course electives *only*, not in directed studies.
- 2) Students are limited to registering in two S-U courses a term.
- 3) S-U registration is limited to 4 credits for each course.
- 4) Students registering for S-U grades must be in good standing.
- 5) Students must fulfill the graduation requirement of 105 letter graded courses.

ILR faculty members assign a grade of U for any grade below C– and a grade of S for any grade of C– or better. A grade of U is considered equal to an F in determining a student's academic standing although it is not included in the cumulative average.

No change of grading (from letter to S-U or from S-U to letter) may be made after the first three weeks of class. *There are no exceptions* to this restriction and appeals will not be accepted.

Incomplete Grades

An Incomplete (INC) is a grade assigned when the course has not been completed for reasons that are acceptable to the instructor. It is understood that the work may be completed later and credit given. Instructors may grant an incomplete grade for a limited number of clearly valid reasons, but only to students with substantial equity in a course. A firm and definite agreement on the conditions under which it may be made up must be made with the instructor. The school's policy allows a maximum of two full terms of residence for removal of an incomplete. An incomplete grade not made up within this time automatically becomes an F.

*College of Arts and Sciences

†May be postponed to the fall of the junior year

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 please contact a counselor in the Office of Resident Instruction. Counselors will explore the program with students to help them decide if it suits their interests.

Dual Registration in Business and Public Administration

Dual informal registration in the School of Business and Public Administration leads to a Bachelor of Science degree in Industrial and Labor Relations and a Master's degree in Business and Public Administration after five years of study and is open to students who meet the requirements of the Graduate School of Business and Public Administration.

Early planning and application by each student, preferably in the sophomore year, is desirable to ensure that Business and Public Administration expectations and the Industrial and Labor Relations curriculum requirements are fulfilled. Students interested in double registration in the Graduate School of Business and Public Administration should contact the Admissions Office, 319 Malott Hall, and a counselor at the Office of Resident Instruction.

Five-Year Master of Science Degree Program

With early planning, it is possible to earn the M.S. degree in a fifth year of study. This program is designed specifically for those who wish concentrated study in an area of specialization in the school for a terminal Master's degree.

Students considering this program should consult a counselor in the Office of Resident Instruction after their freshman year.

Semester Off Campus

For the past few years the semester off campus program has provided students with a vivid understanding of problems in labor and industrial relations through observation and participation in "real-life" labor problem solving. A small number of selected students spend a term of the junior year in Albany, New York City or Washington, D.C. in close contact with practitioners. Their activities include independent research under direction of ILR faculty and seminars drawing on field work experience with employers, labor organizations, and government agencies. More information about this program is available from the Office of Resident Instruction.

Junior Year Abroad

A few students each year are granted permission to register in absentia and continue their studies at a foreign university. Although the school does not have a fixed program for foreign study, students who have studied abroad generally receive some credit for their course work and have found it a very rewarding experience. Students may attend a foreign university of their choosing but guidance in finding and selecting programs is available from the Office of Resident Instruction and from the Career Center, 14 East Avenue.

Collective Bargaining, Labor Law, and Labor History

J. Gross, chairman; G. Brooks, J. Burton, D. Cullen, C. Daniel, R. Doherty, R. Donovan, H. Finch, M. Gold, K. Hanslowe, M. Kelly, M. Kennedy, G. Korman, D. Lipsky, 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, H. Finch, G. Korman, J. Morris. 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, P. Ross, R. Seeber. A comprehensive study of collective bargaining, the negotiation and scope of contracts, the day-to-day administration of contracts, the major substantive issues in bargaining, including their implication for public policy, and the problem of dealing with industrial conflict.

201 Labor Relations Law and Legislation

Fall or spring. 3 credits. M. Gold, J. Gross, K. Hanslowe, M. Kennedy. A survey of the law governing labor relations. The legal framework in which the collective bargaining relationship is established and takes place is analyzed. Problems of the administration and enforcement of collective agreements are considered, as are problems of protecting individual employee rights in the collective labor relations context. Also serves as an introduction to the legal system and method, and to legal and constitutional problems of governmental regulation of industrial and labor relations.

301 Labor Union Administration

Fall. 3 credits. Prerequisites: I&LR 100 and 201. G. Brooks, C. Daniel, R. Seeber. A review of the operations of American unions, including a general theoretical framework, but with major emphasis on practical operating experience. Topics include the formal government of unions; organizational or institutional purposes and objectives and how these are achieved; underlying structure and relationship among members, locals, and national organizations; the performance of the primary functions of organizing; negotiating; contract administration; and the effect of the Landrum-Griffin Act.

303 Research Seminar in the Social History of American Workers

Fall. 4 credits. Limited to upperclass students who have demonstrated their ability to undertake independent work and who have received permission of the instructor.

G. Korman. An examination of a different subject each year.

304 Seminar in the History, Administration, and Theories of Industrial Relations in the United States

Fall or spring. 4 credits. Prerequisite: permission of instructor.

C. Daniel, G. Korman, J. Morris. Designed to explore the social, economic, and political background of industrial relations in the history of the United States. Examines a different subject each year.

306 Research Seminar in the American Labor Movement and Politics

Fall or spring. 3 credits. Prerequisite: I&LR 101. Limited to upperclass students who have demonstrated ability to undertake independent work and who have received permission of the instructor.

J. Morris. Students choose a research topic, using any disciplinary approach (such as law, history, behavioral or political science), within the subject matter area. Group meetings are devoted to (1) discussion in depth of special problems such as compulsory membership and union political spending, the adequacy of the law governing union political action, and labor's partisan ties with the Democratic party, and (2) exchange of research problems and reports. Some time normally devoted to group meetings is scheduled for individual consultations.

307 Industrial Relations Biographies

Fall. 4 credits. Limited to juniors and seniors. Prerequisite: permission of instructor.

J. Morris. A study of American industrial relations history through the lives of some of the outstanding people who have helped make it—men and women of business, government, and the law as well as leaders of labor and their allies among the intellectuals. While economic forces, institutional developments, and social values are important in shaping history, so also is the role of individual personality. Readings and discussions focus on biographies and autobiographies, supplemented in some cases with tapes and films. There will be written assignments but emphasis will be on the weekly discussion.

380 Famous Trials in American Labor History

Spring. 4 credits. Limited to juniors and seniors. Prerequisites: I&LR 100 and permission of instructor.

J. Morris. Some of the famous criminal trials involving union leaders, radicals, and ordinary workmen who were unknown before they faced the bar. Among the defendants or cases which may be considered (charges range from fraud to murder) are Jimmy Hoffa, Sacco and Vanzetti, Mooney and Billings, the Centralia tragedy and trial, the great IWW trials of World War I, the case of Joe Hill, the Haymarket anarchists, the trial and execution of the Molly Maguire leaders, and the triple case of Moyer, Haywood, and Pettibone.

381 Jewish Workers in Europe and America, 1789–1948

Spring. 4 credits. Open to sophomores, juniors, and seniors.

G. Korman. This course in comparative history examines the complex experiences of the Yiddish-speaking immigrant workers and their families. A special subject of interest is the extraordinary history of the Jewish working classes between 1924 and 1948.

400 Union Organizing

Spring (meetings twice a week for seven weeks). 2 credits. D. Cullen, R. Donovan. This course explores various aspects of unions' attempts to organize workers: why some workers join unions and others do not; the techniques used by both unions and employers during organizing campaigns; and the present law of organizing and proposed amendments to that law. Includes an exam and a research paper.

401 Collective Bargaining Structures

Fall. 3 credits. Prerequisite: I&LR 200. D. Lipsky. An examination of the conduct of collective bargaining with emphasis on the size and scope of the bargaining unit and the locus of decision making in collective negotiations. The relation between bargaining structure and product market structure, public policy, and union structure is studied. Industry and case studies of various bargaining structures, including pattern bargaining, coalition bargaining,

and multiemployer bargaining are used to illustrate general principles. Wage patterns and the economic effects of bargaining structures are also examined. A seminar course.

403 The Law of Workers' Compensation and Occupational Safety and Health Fall (seven weeks only). 2 credits.
J. Burton.

A survey of legal aspects of workers' compensation, the program that provides cash benefits, medical care, and rehabilitation services to workers disabled by work-related injuries and diseases. The course also examines legal developments concerning the Occupational Safety and Health Act of 1970.

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 Spring. 3 credits. Prerequisites: I&LR 100 or 502 or permission of instructor.
C. Daniel.

An examination of the contemporary history, administration, policies, and problems of American trade unions. Each semester the course focuses on particular aspects of the labor movements.

495 Honors Program Fall and spring (Yearlong course). 3 credits each term. Admission to the ILR Senior Honors Program may be obtained under the following circumstances: (a) students must be in the upper 20 percent of their class at the end of their junior year; (b) an honors project, entailing research leading to completion of a thesis, must be proposed to an ILR faculty member who agrees to act as thesis supervisor; (c) the project, endorsed by the proposed faculty sponsor, is submitted to the Committee on Academic Standards and Scholarships.

Accepted students embark on a two-semester sequence. The first semester consists of determining a research design, familiarization with germane scholarly literature, and preliminary data collection. The second semester involves completion of the data collection and preparation of the honors thesis. At the end of the second semester, the candidate is examined orally on the completed thesis by a committee consisting of the thesis supervisor, a second faculty member designated by the appropriate department chairperson, and a representative of the Academic Standards Committee.

498 Internship Fall or spring. 4–9 credits. Designed to grant credit for individual research under the direction of a faculty member by mature upperclass undergraduates who have been selected for an internship. All requests for permission to register for 498 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.

499 Directed Studies Fall or spring. 3 credits. For individual research, conducted under the direction of a member of the faculty, in a special area of labor relations not covered by regular course offerings. Registration is normally limited to seniors who have demonstrated ability to undertake independent work. Eligible students should consult a counselor in the Office of Resident Instruction at the time of course registration to arrange for formal submission of their projects for approval by the Academic Standards Committee.

500 Collective Bargaining Fall or spring. 3 credits. Open only to graduate students. It is recommended that 501, Labor Relations Law and Legislation, be taken prior to or concurrently with 500.
D. Cullen, D. Lipsky.

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 setting industrial controversy, the various substantive issues, and important developments and trends in collective bargaining.

501 Labor Relations Law and Legislation Fall or spring. 3 credits.
M. Gold, J. Gross, K. Hanslowe.

A survey and analysis of the labor relations law which 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.

A presentation of the history of labor in America with emphasis on post-Civil War trade union development. Includes an analysis of the structure and functions of the various units of labor organization, ranging from the national federation to the local union, and some consideration of special problems and activities, such as democracy in trade unions and health and welfare plans, as well as of various types of unions, such as those in construction, maritime trades, entertainment, transportation, and basic industry.

600 Advanced Seminar in Labor Arbitration Spring. 3 credits. Limited to juniors, seniors and graduate students. Prerequisite: I&LR 602 or equivalent and permission of instructor.
J. Gross, K. Hanslowe.

An advanced seminar in labor arbitration emphasizing the practical aspects of current labor arbitration techniques and problems. Subjects considered range from laboratory exercises in the presentation of an arbitration case, the preparation of prehearing and posthearing briefs, and the writing of an arbitration opinion and award, to the investigation and evaluation of the experience of labor arbitrators with selected case problems arising in state and federal employment and public education as well as in the private sector.

601 Integration of Industrial Relations Theories Fall or spring. 3 credits. Open to second-year graduate students and seniors.

An exploration of the similarities and differences among the (1) normative premises, (2) theoretical frameworks, (3) substantive issues, and (4) methodological approaches found in the various areas of study in industrial relations. The areas studied include (1) collective bargaining and union-management relations, (2) organizational behavior and personnel, and (3) labor economics and manpower policy. An effort is made to explore the potential for integration among these various areas by discussing some issues or problems that cut across the traditional lines of study.

602 Arbitration Fall or spring. 4 credits. Prerequisites: undergraduates, I&LR 200; graduate students, I&LR 500. Limited to 21 students.
J. Gross, C. Rehmus.

A study of the place and function of arbitration in the field of labor-management relations, including an analysis of principles and practices, the law of arbitration, the handling of materials in briefs or oral presentation, the conduct of an arbitration hearing, and the preparation of an arbitration opinion.

603 Governmental Adjustment of Labor Disputes Fall or spring. 4 credits. Prerequisites: undergraduates, I&LR 200; graduate students, I&LR 500.
D. Cullen.

An examination of the various governmental techniques for dealing with labor disputes in both the private and public sectors, including mediation, fact finding arbitration (both voluntary and compulsory), the use of injunctions, and seizure. The course also examines the application of these techniques under the Railway Labor Act, Taft-Hartley Act, and various state acts.

604 Readings in the Literature of American Radicalism and Dissent Fall or spring. 3 credits. Limited to seniors and graduate students.

Each term concentration is on a different historical aspect of American radicalism and dissent. Some examples of areas and writers who might be selected for study are: agrarian reform—Thomas Skidmore, George Henry Evans, and Ignatius Donnelly; anarchism—Josiah Warren, William D. Haywood, Emma Goldman, and Paul Goodman; communism—John Reed, Jay Lovestone, and William Z. Foster; economic dissent—Henry George, Thorstein Veblen, and Francis Everett Townsend; equal rights for Negroes 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: permission of instructor.
J. Gross, K. Hanslowe.

The impact of law and public policy on the arbitration of labor disputes in both the private and public sectors. Some of the topics covered include the law of arbitration, the scope of judicial review, the interaction between Title VII and arbitration, and individual rights to due process in the handling of grievances. Students prepare briefs, argue cases, and write awards. As opportunity permits, students are invited to attend actual arbitration hearings and to write mock awards. Each student also writes a research paper on a topic within the general scope of the course and presents it in summary form to members of the seminar for criticism and evaluation.

608 Special Topics in Collective Bargaining, Labor Law, and Legislation Fall or spring. 3 credits. Prerequisites: undergraduates, I&LR 201; graduate students, I&LR 502.
Staff.

The areas of study are determined each semester by the instructor offering the seminar.

609 Public Policy and Labor Relations Fall. 3 credits. Prerequisites: one term of labor law and some course work in statistics.
D. Lipsky.

This seminar examines the application of public policy in labor relations with particular emphasis on the empirical, nonlegal analysis of the impact of national and state laws on the behavior of managements, unions, and workers. Several important public policy questions are examined in the course: What is the real impact of duty to bargain requirements on the behavior of the parties in negotiations? How effective are NLRB remedies in actually changing the behavior of the parties? What are the determinants of certification of election outcomes? What evidence is there on the impact of right-to-work laws on union organizing and bargaining?

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. 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 workmen's compensation and unemployment insurance systems.

682 Seminar in Labor Relations Law and Legislation Fall or spring. 3 credits. Prerequisite: permission of instructor. Limited enrollment.
K. Hanslowe, M. Kennedy.

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, or J. Morris.
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 the 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.
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. Prerequisite: I&LR 200 or 500. Limited to 25 students.

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.

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 500 and 723 or their equivalents. Recommended: A statistics course beyond the level of I&LR 510.

D. Lipsky.
This is a second-level course in collective bargaining that builds on the institutional research covered in 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.

707 Research Seminar in Public Sector Collective Bargaining Spring. 3 credits. Prerequisites: basic familiarity with statistical analysis (correlational and multivariate techniques) and interest in theoretical and empirical research on issues related to public sector labor relations.

P. Ross.
(1) Discussion of the role of theory in collective bargaining research. Issues such as what is a theory, how is a theory constructed and made operationally testable, and what kinds of theoretical frameworks have been used in public sector research are addressed. (2) Determination of what alternative

research strategies have been used and might be used in collective bargaining research. (3) Evaluation of existing theoretical and empirical research in the public sector. (4) Analysis of current and future research needs. Each student submits a seminar paper.

708 Industrial Relations in Health Care Institutions Spring. 3 credits.

G. Brooks, P. Ross.
A study of the laws, institutions, and practices that characterize this rapidly changing field, and of the special complexities of the nonprofit sectors as they appear in health care. Attention is given to the character of the unions in the industry, to the problems of collective bargaining that flow from the nature of the industry and its work force, and to the contractual relations that have developed. The principal economic problems that have complicated the collective bargaining relationship are also discussed. Where appropriate, distinctions are made among public, nonprofit, and proprietary institutions.

799 Directed Studies Fall or spring. Credit to be arranged.
For individual research conducted under the direction of a member of the faculty.

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.

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, I. Francis, P. Velleman

210 Statistics (Statistical Reasoning) Fall or spring. 3 credits.

An introduction to the basic concepts of statistics: description of frequency distributions (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.

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. A continuation of I&LR 210. 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 course description, see p. 293.

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, and 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.

[711 Seminar in Statistical Methods Spring. 3 credits. Will not be offered 1981-82.

I. Francis.
The philosophical problems of drawing inferences from observational data and the use of computer programs in the statistical analysis of behavioral social science data. Exact contents may vary from term to term. A detailed description is available before registration.]

[712 Theory of Sampling Fall. 3 credits. Will not be offered 1981-82. 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 course description, see page 000.

International and Comparative Labor Relations

J. Windmuller, chairman; M. Clark, G. Fields, W. Galenson

330 Comparative Industrial Relations Systems I

Fall and spring. 3 credits (in some cases 1 additional credit may be arranged with the instructor). Open to juniors and seniors.

J. Windmuller.
An introductory course concerned with the contemporary structure, institutional arrangements, and philosophy of the labor relations systems of several countries in advanced stages of industrialization. Countries to be examined include: Great Britain, France, Germany, Sweden.

331 Comparative Industrial Relations Systems II

Spring. 3 credits (in some cases 1 additional credit may be arranged with the instructor). Open to juniors and seniors.

J. Windmuller.
A study of the industrial relations systems of non-Western countries in various stages of economic development and in various political contexts, including Japan, the Soviet Union, Yugoslavia, India, and several others. Emphasis on the role of government, trade unions, and collective bargaining. The course will also include a review of international organizations that affect industrial relations in less developed countries.

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 major European countries, especially Great Britain, France, and Germany between 1850 and 1950. Patterns of 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 course description, see p. 000.

530 Comparative Industrial Relations Systems I

Fall and spring. 3 credits.

J. Windmuller.
Students in this course attend the lectures in ILR 330 (see description for ILR 330). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in ILR 330 and related topics.

531 Comparative Industrial Relations Systems II

Spring. 3 credits.

J. Windmuller.
Students in this course will attend the lectures in ILR 331 (see description for ILR 331). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in ILR 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 ILR 332). If enrollment warrants they will also meet separately at a time to be arranged for discussion of topics in I&LR 332 and additional topics.

630 Seminar in International and Comparative Labor Problems

Spring. 3 credits. Prerequisite: I&LR 330 or 331, 530 or 531, or permission of instructor. Intended for students with some background in international and comparative labor relations.

J. Windmuller.
An opportunity for organized reading and research on one or two central themes which change from year to year. Topics in recent years have included the labor aspects of the multinational corporation, worker participation in management, international labor movements, and American labor and world affairs.

799 Directed Studies For course description, see p. 294.

Labor Economics

R. Smith, chairman; R. Aronson, J. Burton, R. Butler, G. Clark, R. Ehrenberg, G. Fields, W. Galenson, R. Hutchens, O. Mitchell, J. Sveinar

140 Development of Economic Institutions

Spring. 3 credits. Prerequisite for non-ILR students: permission of instructor.

G. Clark.
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.

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.

340 Economic Security Fall. 3 credits.

R. Hutchens, R. Butler.
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, including guaranteed income proposals.

341 Protective Labor Legislation Spring.

3 credits. Open to juniors and seniors.

R. Butler.
A survey of the nature of the problems and the basis for state and federal legislation in areas such as discrimination in employment, migratory labor, industrial health and safety, minimum wages and maximum hours, and child labor. Special attention is given to the problem of maintaining a proper balance

among the efforts of industry, organized labor, and government in the development of labor standards. Proposals for amending existing legislation are discussed.

343 Problems in Labor Economics Fall or spring. 4 credits. Prerequisites: I&LR 240 or Economics 311, and background in statistics through regression analysis, or permission of the instructor.

R. Ehrenberg.
An advanced course dealing with the theory and empirical analysis of labor markets and their applications to policy issues. The specific topics covered vary. The course is designed to increase students' competence in applying microeconomic theory and econometrics to policy issues. Each student completes an econometric research project as part of the course.

344 Comparative Economic Systems: Soviet Russia Spring. 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.

346 Economics of Collective Bargaining Fall or spring. 3 credits.

D. Lipsky, J. Svejnar.
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.

440 Health, Welfare, and Pension Plans Spring. 3 credits. Open to juniors, seniors, and graduate students.

O. Mitchell.
An analysis and appraisal of private health, welfare, and pension plans. Consideration of the origin and development of employer, union, and joint programs; a critical examination of the financing, administration, and general effectiveness of the plans.

441 Income Distribution Fall. 3 credits. Open to upperclass and graduate students.

G. Fields.
Explores income distribution in the United States and the world. Topics to be covered include: functional and size distributions of income, wage structure, income-generating functions and theories, discrimination, poverty, public policy and income distribution, international comparisons, and changing income distribution and growth.

446 Seminar on Employment Policies and Problems of the College Educated Fall or spring. 3 credits.

R. Aronson.
A study of the labor market behavior, institutions and public policies relating to the college-trained persons, especially those of the technological and human services professions. The roles of the universities, government, and professional societies in determining the development, utilization, and compensation of these occupations is investigated. Topics or occupations selected for more intensive study are chosen according to individual interest.

495 Honors Program Fall and spring (yearlong course). 3 credits each term. For course description, see p. 293.

498 Internship Fall or spring. 4–9 credits. For course description, see p. 294.

499 Directed Studies For course description, see p. 293.

540 Labor Economics Fall or spring. 3 credits. Required of graduate students majoring or minoring in labor economics and income security and M.I.L.R. candidates. Prerequisites: Economics 101–102 or equivalent.

R. Aronson, R. Smith.
Economic issues in the employment and compensation of labor. Topics discussed include labor force growth and composition, structure and functioning of labor markets, unemployment, wage theories, wage levels and structures, the economic influence of unions, income distribution, and the problem of poverty.

541 Social Security and Protective Labor Legislation Fall. 3 credits. Normally required of graduate students majoring or minoring in labor economics and income security and required of M.I.L.R. candidates.

J. Burton.
The fundamental aspects of employee protection and income security. Emphasis is on state and federal minimum wage and hour laws, antidiscrimination legislation, employee benefit programs, social insurance, and public welfare programs. The underlying causes of the legislation, the legislative history, the administrative problems and procedures, and the social and economic impact of the legislation is studied.

640 Economics of Manpower Fall. 3 credits. Prerequisite: I&LR 540 or equivalent; open to qualified undergraduates.

R. Aronson.
Survey of the economic background and selected issues in manpower policy and planning. Labor market processes and behavior involved in the development and implementation of manpower programs are treated systematically. Special topics are arranged in accordance with student interests.

641 Comparative Economic Systems: Soviet Russia Fall or spring. 3 credits. Prerequisite: I&LR 344.

G. Clark.
Preparation and discussion of individual papers on selected topics concerning the Soviet economy.

642 Work and Welfare: Interactions Between Cash Transfer Programs and the Labor Market Fall. 3 credits. Prerequisite: some familiarity with microeconomics.

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.
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 Economics of the American System of Private Enterprise (also Economics 355/555) Fall. 4 credits.

R. Frank.
A critical examination of the private sector of the United States economy; its history, some leading current relevant issues, and its relation to the theoretical and philosophical interpretations of the market economy.

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 Economics of the American System of Private Enterprise (also Economics 356/556) Spring. 4 credits.

R. Frank.
A continuation of I&LR 645, although 645 is not a prerequisite to 648.

649 Seminar on Investment in Man Spring. 3 credits. Prerequisite: 540 or equivalent.

R. Butler.
This course will examine activities that influence monetary and psychic income by changing the "human capital" of individuals. The theoretical models employed will be developed heuristically, with equal emphasis given to their empirical implementation. We begin looking at life cycle models of earnings in which the demand for and effects of education, on-the-job training, and health care are derived. In the last part of the course, we will discuss the role that changing levels of educational opportunity and market discrimination have played in the recent dynamic trends in black labor market status.

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.

W. Galenson.
Reading and discussion of selected topics in labor economics in the fields of theory, institutions, and policy.

746 Economic Theory and Labor Market Issues Spring. 3 credits. Prerequisite: I&LR 540 and permission of the instructor.

R. Smith.
This seminar course is intended as a follow-up to I&LR 540 and is designed for students who want a general exposure to economic theory and its applicability to a variety of labor market issues. The first part of the course emphasizes student analyses of assigned topics; during the second half students analyze topics of their own choosing. Topics discussed in the past include day care and labor supply, insurance issues in the labor market, wage and price controls, issues in coal mine safety, immigration policy, and jobs and the environment.

798 Internship For course description, see p. 294.

799 Directed Studies For course description, see p. 294.

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

L. Gruenfeld, chairman; H. Aldrich, acting chairman 1981–82; S. Bacharach, T. Hammer, S. Kirmeyer, N. Rosen, R. Stern, H. Trice, L. Williams

120 Society, Industry, and the Individual I Fall. 3 credits.

H. Aldrich, R. Stern.

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 Society, Industry, and the Individual II Spring. 3 credits.

L. Williams.

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.

221 Social Issues and Social Theory in Industrial Society Spring. 3 credits.

H. Aldrich.

A survey of the literature on organization-environment and interorganizational relationships.

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 upon the implementation of environmental protection, occupational health and safety, equal opportunity, anti-trust, and rate-setting regulations.

320 The Psychology of Industrial Engineering Fall. 4 credits.

T. Hammer.

A study of the human factors in the industrial engineering of work, work places, tools, and machinery. The course examines the aspects of individual and social psychology that operate in the work setting and that should be taken into account in the design of jobs. These include limitations of the human sensory system; individual difference in skills, abilities, motives, and needs; group dynamics; intrinsic motivation; job satisfaction; conflict.

321 Stress at Work Fall and spring. 4 credits.

S. Kirmeyer.

Explores the impact of the social psychological demands of work environments on employee stress. Among the topics to be discussed are (1) conceptual models of stress, (2) social, situational, and personal

factors mediating the effects of stressors, and (3) adaptive coping processes. Readings will focus on the person-environment fit in the work setting, social support networks as well as on environmental stressors such as noise, high density, job structure, and unemployment. Specific attention will be given to the stressors faced by employees in service occupations.

322 Comparative Theories of Organizational Behavior and Social Character Fall. 3 credits.

L. Gruenfeld.

A comparative social-psychological approach is used to examine theories of work, authority, conflict and change in employment organization.

323 Introduction to the Study of Attitudes Fall. 4 credits. Open to juniors and seniors.

T. Hammer.

Designed to acquaint the student with what is known about (1) origins of human attitudes, (2) the determinants of attitude change, and (3) the measurement of attitude differences. Studies employing clinical, experimental, and survey techniques are discussed. Each student designs, executes, and analyzes a research study of his or her own.

324 Organizations and Deviant Behavior Spring. 3 credits. Limited to 40 students. Prerequisite: one or more courses in both sociology and psychology.

H. Trice.

Focus is on the relationship between organizations and deviant behavior. Covers (1) the nature and etiology of psychiatric disorders, particularly schizophrenia, the psychoneuroses, and psychosomatic disorders; (2) organizational factors related to these disorders and to the more general phenomena of role conflict and stress; (3) an examination of alcoholism as a sample pathology, in terms of personality characteristics and precipitating organizational factors; (4) evaluation of organizational responses to deviance; (5) the nature of self-help organizations such as Alcoholics Anonymous; and (6) the structure and functioning of the mental hospital.

325 Organizations and Social Inequality Spring. 4 credits.

H. Aldrich.

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 which deals with the evolution of current control and compensation structures in large scale organizations.

326 Sociology of Occupations Fall. 3 credits. Prerequisite: one or more courses in sociology.

H. Trice.

Focuses on (1) the changing character of American occupations within the context of social change; (2) occupational status—differences in income, prestige, and power and the resultant general phenomenon of social stratification; (3) vertical and horizontal occupational mobility; (4) recruitment and socialization into occupational roles; (5) the process of professionalization; and (6) comparison of personnel occupations with the career and organizational patterns of other occupations. A major sociological theme is the relationship between occupational structure and workplace structure.

327 Psychology of Industrial Conflict Fall. 4 credits.

N. Rosen.

An application of frustration theory to the analysis of conflict and stress in organizations and society. Comparisons are made between industrial relations, race relations, international relations, and other

settings. Readings include behavioral research findings from a variety of studies in industry. Relevant contributions from experimental, social, and clinical psychology are also considered.

328 Cooperation, Competition, and Conflict Resolution Spring. 4 credits. Prerequisite: two courses in social psychology or equivalent. An examination of theory and empirical evidence relating to the resolution of interpersonal, intergroup, and international conflict. Specific attention is devoted to studying factors that contribute to the development of cooperative or competitive bonds between parties to a conflict. The following topics are studied: the availability and use of threat; the credibility, intensity, and costs of threat; fractioning and escalating conflict. Personality and situational factors that regulate conflict intensification are stressed.

329 Sociological Analysis of Organizations Fall. 3 credits. Prerequisites: I&LR 120 and 121 or equivalent.

S. Bacharach.

Introduces students to the basic issues involved in the sociological analysis of organizations. It traces organizational theory from Max Weber to the most recent research. Among the themes to be discussed are: internal structure of organizations, communication in organizations, decentralization, organizational change, organizational technology, and organizational environment.

370 The Study of Work Motivation Fall. 4 credits. Open to juniors and seniors with permission of instructor.

T. Hammer.

Designed to acquaint the student with the basic concepts and theories of human motivation with implications for organizational change and job design. Focus is on theories of worker motivation and on research approaches and results as these apply to individuals and groups in formal organizations. Readings are predominantly from the field of organizational psychology, supplemented by relevant contributions from experimental, social, and clinical psychology. Each student will design, execute, and analyze a research study of his or her own.

371 Individual Differences and Organizational Behavior Fall. 4 credits. There are no formal prerequisites for this course. Some acquaintance with the substance and methods of behavioral or social science will be helpful.

L. Gruenfeld.

This course considers several related theories of personality relevant to an understanding of behavior and experience in organizations. The emphasis is on comparative systems of work cultures and corresponding social character types. A unit on the assessment of personality and a strategy for verification of theories of personality are presented to highlight research findings relevant to motivation, leadership styles, conflict, and stress in organizations.

373 Organizational Behavior Simulations Spring, weeks 1–7. 2 credits. Prerequisite: I&LR 120 and 121 or equivalent.

R. Stern.

Basic principles of organizational behavior are studied through readings and participation in two simulation games. The first game, *The Organizational Game: Design, Change, and Development* by Miles and Randolph, simulates traditional organization, while the second, *The Fuzzy Game* by Paton and Lockett, simulates a cooperative. Organizational design, decision making, and conflict are the central topics of discussion. The contrasting bases of power in the two organizations permits the study of the assumption underlying organization structure and process.

420 Group Processes Fall. 4 credits.

L. Gruenfeld, N. Rosen.
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.

421 Social Organization of the Urban Community Fall. 4 credits.

H. Aldrich.
An examination of the social organization of the urban community, focusing on ethnic and racial ghettos, the police, and business, industrial, political, and educational organizations. The urban community is treated as a group of specialized activity systems, with a view toward studying the interrelation among the various systems. Special attention is given to community conflict such as civil disorders. Students take part in a research project dealing with an urban issue and write a term paper based on the project.

422 Groups in Work Organizations Fall. 4 credits. Enrollment limited. Prerequisite: permission of instructor.

N. Rosen.
This is an applied social psychology course that emphasizes the building, maintenance, and renewal of purposive groups working in formal organizations. The course deals with models and variables that interact with group cohesion and performance. Structural, environmental, task, motivational, and interpersonal variables are considered. This is not intended as a sensitivity training lab; the course work is substantive and includes observation and analysis of live work groups in the field.

423 Evaluation of Social Action Programs Fall. 3 credits.

H. Trice.
A consideration of the principles and strategies involved in evaluation research; experimental research designs, process evaluation, and adaptations of cost benefits and cost efficiency to determine the extent to which intervention programs in fields such as training and therapy accomplish their goals. The adaptation of these strategies to large social contexts, such as child guidance clinics, mental health clinics, and programs in the poverty areas such as Head Start is considered. Includes fieldwork and emphasizes assessment of program implementation.

424 Study of Public Sector Bureaucracy Spring. 3 credits. Prerequisite: permission of instructor.

S. Bacharach.
Field research in public sector organizations, such as a school bureaucracy or a social welfare bureaucracy. Students conduct a major study into which they integrate themes from organizational theory. Theoretical issues such as decentralization, participation, and communication are discussed in the seminar.

425 Sociology of Industrial Conflict Spring. 4 credits.

R. Stern.
The focus is on the variety of theoretical and empirical evidence available concerning social, economic, and political causes of industrial conflict. The manifestations of conflict such as strikes, labor turnover, absenteeism, and sabotage, and the influence on the environments in which they occur is emphasized.

426 Theories of Industrial Society Fall. 4 credits. Prerequisite: I&LR 120 and permission of instructor.

S. Bacharach.
Concentrates primarily on the works of Weber and Marx, and will consist of readings in the original texts.

427 The Professions: Organization and Control Fall. 4 credits.

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.

473 Ecological Psychology: Behavior Setting Analysis within the Organizational Context Fall. 3 credits.

S. Kirmeyer.
The origins, methods, and central concerns of ecological psychology. Ecological psychology is one of the areas of specialization in psychology that has developed a theoretical framework and research technique for the study of behavior in everyday environments. Methods used to develop observation records as well as techniques used to divide the behavior stream into structural units will be examined. The primary focus of the course will be the more recent concerns of ecological psychology, namely, the study of community and organizational behavior settings. Assigned reading will provide an overview of the theory of behavior settings, the methods used to identify and describe settings, as well as practical applications in organizational psychology. Behavior-setting theory will be used as a point of departure in examining selected topics in organizational psychology, these include: person-environment fit in the work setting, the impact of organizational size of social climate, work-life quality and job enrichment programs, and overload stress and staff "burn-out" in service settings.

475 Organizational and Political Behavior in School Districts Fall. 4 credits. Enrollment limited. Prerequisite: permission of instructor.

S. Bacharach.
This course is intended to provide students with research experience through the study of the administrative and governance processes in school districts. The students will be required to work with school district and union personnel while investigating the following areas: (a) structure and process of decisionmaking 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, (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 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) teacher unions' involvement with school district policies.

495 Honors Program Fall and spring (yearlong course). 3 credits each term. For course description, see p. 293.**498 Internship** Fall or spring. 4-9 credits. For course description, see p. 293.**499 Directed Studies** For course description, see p. 293.**520 Organizational Behavior I** 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 Organizational Behavior II Spring. 3 credits.

S. Bacharach.
Formal organizations are studied from the perspectives of classical organization theory, human relations theory, and comparative and cross-cultural analysis. Contemporary theories and quantitative approaches to organizational structure are also considered in some detail. Intended to be preliminary to more intensive work in organizational behavior.

620 Theories of Organizational Change, Innovation, and Evaluation Fall. 4 credits.

Prerequisite: two organizational behavior courses at the 300 level, or advanced courses in sociology or psychology.

H. Trice.
This seminar examines the dynamics of individual, structural, and environmental factors operating in organizational change in general, and in the implementation and use of innovations within formal organizations in particular. The role of evaluative research in assessing the effectiveness of the implementation of innovations and in determining organizational effectiveness are analyzed. Several case studies of organizational change in government, unions, and private industry are examined. The emphasis is on conceptual frameworks for analyzing organizational change and mounting evaluative research on innovations. Readings are interdisciplinary and include sociology, psychology, and political science.

621 Growth of the World Capitalist-Industrial System Spring. 4 credits. Enrollment limited.

Prerequisite: permission of instructor.
H. Aldrich.
This course examines the origins of the world-scale capitalist system from the sixteenth century through the beginnings of large-scale industrialization in the U.S. in the late nineteenth century. Emphasis is on concepts and methods for world-systems analysis rather than on detailed historical knowledge of a specific era. The relevance of world-systems analysis for current international sociopolitical phenomena, including underdevelopment and the rise of multinational corporations, is discussed. Students play major role in leading class discussions and in choosing topics for discussion.

622 The Organization and its Environment

Spring. 3 credits. Prerequisites: two organizational behavior courses at the 300 level, or advanced courses in sociology or psychology.

H. Aldrich.
A survey of the literature on organization-environment and interorganizational relationships. Emphasis is on two tasks: developing typologies of inter-organizational relations, and exploring methods of measuring or quantifying such relations. Students in the seminar will be expected to write a research paper in which they apply an organization-environment or interorganizational perspective to a particular set or 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; course meets for only 7 weeks. 2 credits.
H. Aldrich.

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 industrializations 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.
N. Rosen.

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 a job satisfaction and performance. What can be inferred from studies that ignore age (sex, social class, and cultural) differences? What are the causes and patterns, both subjective and objective, for age and other kinds of discrimination.

629 Personality in Organization Fall and spring. 4 credits. Prerequisite: I&LR 520 or equivalent.
S. Kirmeyer.

The aim of this course is to train students in the skills required to use observational methods. The topics to be covered are: (1) reasons for choosing an observational method, (2) specific techniques used to study nonverbal communication, verbal interaction, and molar activity patterns, and (3) the steps involved in collecting and analyzing observational data.

630 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; course meets for only 7 weeks. 2 credits. Prerequisites: two organizational behavior courses at the 300 level, or advanced courses in sociology or psychology.
R. Stern.

Interorganizational relations are examined in terms of networks of control agents and target objects. The dynamics of control relationships based on political bargaining, the distribution of power, economic rewards and costs, and historical circumstances are examined in the context of their evolution through organizational adaptation to the environment. Subject matter includes theories of organizational change and application of a control perspective to the institutions of American business, government regulations, athletics, and education.

677 Seminar in Field Research Spring. 4 credits. Enrollment limited. Prerequisite: permission of instructor.
H. Trice.

Recent research efforts are examined and the dynamic nature of the research process is emphasized. The realities of field research are explored, including problems of gaining and sustaining rapport, the initial development of research interviews and observation data, and their conversion to quantitative instruments. Participants to share in the exploration of appropriate theories and concepts and the possibility of actual field participation in an on-going research project is explored.

722 Theories of Organizational Behavior Fall. 3 credits.
L. Gruenfeld.

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.

Material studied in I&LR 723 and 724 includes: (1) theoretical, conceptual, and ethical questions; (2) survey research and attitude scaling procedures; (3) laboratory research methods; (4) participant observation and interview methods; (5) use of documents and qualitative data analysis. Provides students with important philosophical background for doing research and exposes them to a well-balanced, interdisciplinary set of quantitative and qualitative research tools.

724 Behavioral Research Theory, Strategy, and Methods II Spring. Variable credit. Prerequisite: permission of instructor. Must be taken in sequence with 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.
T. Hammer.

See I&LR 723 for course description.

725 Analysis of Published Research in Organizational Behavior Fall. 3 credits. Prerequisites: I&LR 520–521 and one year of statistics.
N. Rosen.

An advanced research methods course that examines critically 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.
S. Bacharach.

A team-taught comparison of different disciplinary approaches to organizational analysis and models. Emphasis is on integrating different disciplinary approaches to selected organizational phenomena such as change and innovation, decision making and information processing, reward structures, or conflict resolution.

727 Work and Industrial Conflict Spring, weeks 7–14. 2 credits.
R. Stern.

A concentrated examination of the sociology of industrial conflict. The seminar focuses on classic formulations of conflict theory in sociology, then the social, political, and economic causes of industrial conflict. Forms of conflict to be studied include strikes, turnover, absenteeism, and sabotage. Some discussion of the implications of various types of worker management of firms for industrial conflict will be included.

728 Seminar on Work Motivation Spring. 2 or 4 credits. Prerequisite: 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 together with empirical research available in the job design area. The course will cover early theories and research in job design, from scientific management and later developments, with particular attention paid to the recent emphasis on job design through job enlargement and job enrichment.

798 Internship For course description, see p. 294.

799 Directed Studies For course description, see p. 294.

Personnel and Human Resource Studies

L. Dyer, chairman; J. Boudreau, V. Briggs, T. DeCotiis, R. Eder, F. Foltman, W. Frank, G. Milkovich, F. Miller, S. Mueller, R. Riskey, W. Wasmuth, W. Wolf

260 Personnel Management Fall and 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.

262 Urban Problems and Public Policy

Programs Fall. 4 credits. Prerequisite: I&LR 261 or equivalent, or permission of instructor.

R. Risley.

A seminar concerned with selected urban problems and service programs developed to cope with them. Consideration is given to both public and private programs, their organization, and comparative methods of operation. Each student is required to conduct a study of a selected organization involving field research.

360 Public Policy and the Development of Human Resources Fall and spring. 3 credits. Open to sophomores, juniors, and seniors.

V. Briggs, S. Mueller.

A review of contemporary labor market trends and theories pertaining to labor market intervention through public policy measures. Changes in the "older" programs of apprenticeship, vocational education, and vocational rehabilitation as well as the "new" programs of the "post CETA era" are studied. Special policy issues pertaining to youth, rural workers, welfare reform, public service employment, and worker relocation will be examined. Comparison will also be made with European initiatives.

361 Effective Supervision Fall. 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.

363 Techniques and Theories of Training in Organizations Fall. 3 credits.

F. Foltman, W. Frank.

A course directed toward (1) examination of basic psychological formulations of learning relevant to the training of personnel in organizations; (2) review of the methods available for use in organizational training.

364 Communication in Organizations Fall. 3 credits.

W. Frank.

Devoted primarily to the study and analysis of organizational communication. Emphasis is on the examination of the communication process, models, meaning and language, channels and networks, and interpersonal and intergroup issues.

365 New York State—Human Resource and Employee Relations Issues and Policies Fall and 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 which will be discussed in the seminar and developed into a term paper.

366 Women at Work Fall or spring. 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 and 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.

460 Private Sector Programs for Employing and Training Disadvantaged Workers Fall. 3 credits. Prerequisites: I&LR 360 or equivalent.

S. Mueller.

Examines private sector experiences with special programs for hiring, training, and upgrading disadvantaged workers. Although the primary emphasis is on programs targeted for the economically disadvantaged, some programs for the physically handicapped and for women in nontraditional jobs are also covered. During the course of the semester students are asked to develop a general strategy for evaluation of both the design and impacts of such programs, and then to test this evaluation strategy on a program of their own choosing.

461 The Social Tensions of Labor Market Reform Spring. 3 credits.

S. Mueller.

Examines the social implications of recent changes in traditional work roles among minority groups, adult women, rural migrants, and youths. Special emphasis is given to market adjustments brought about by the equal opportunity, welfare reform, and human resource legislation of the 1960s, 1970s, and 1980s.

463 Planning Area-wide Employment and Training Programs Fall. 3 credits.

S. Mueller.

Study of the design and delivery of local programs for the unemployed and "hard-to-employ." The following general areas will be analyzed: the present delivery system, decentralization and subcontracting, analyzing the job requirements of the local labor market and the needs of the unemployed, and program evaluation and techniques.

465 Sectoral Variations in Human Resource Policy Fall. 3 credits.

S. Mueller.

Provides an overview of economic and social issues involved in national human resource policies and their applications to particular industrial or occupational labor markets. Students study an industry or occupation of their choice, to show how labor is allocated within this market, what the social impacts of these processes are, and how existing public and private employment policies affect these outcomes.

467 Job Creation: Policy Emergence and Current Issues Fall. 3 credits. Prerequisite: ILR 360.

V. Briggs.

The evolution of public policy initiatives designed explicitly to create jobs. Most of the attention is given to developments in the United States but related efforts in other nations will also be examined. The reasons why job creation was a late addition to human resource policy are explored. Special attention is given to the associated policy issues: among these are targeting, substitution, job restructuring, union attitudes, and participation of community-based institutions.

469 Human Resources and Immigration Policy in the United States Spring. 3 credits.

V. Briggs.

The role that immigration has played as a source of human resource development in the United States. The primary focus is on developments since the

Immigration Act of 1965. In addition to legal immigration, the topic of illegal immigration and its effects are also examined. Public policy aspects of the issue are explored in depth.

495 Honors Program Fall and spring (year-long course). 3 credits each term. For course description, see p. 293.**498 Internship** Fall or spring. 4–6 credits. For course description, see p. 293.**499 Directed Studies** For course description, see p. 293.**560 Personnel Management** Fall and 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.

659 Career Planning and Development Fall. 3 credits.

R. Eder, F. Foltman.

Consideration of career planning and development from both the organizational and individual perspectives.

660 Seminar in Personnel or Human Resource Management Fall or spring. 3 credits.

Staff.

A "floating" seminar designed to give faculty and students an opportunity to pursue specific topics in detail. Topics vary from semester to semester. Interested students should consult current course announcements for details.

662 Management Training Simulation: Public Policy Issues in Social Agencies Spring. 3 credits. Prerequisite: I&LR 260 or equivalent.

W. Wasmuth.

Techniques of simulation are applied to a vocational rehabilitation facility, a community hospital, and a hotel banquet operation. Although much of the material relates to health services management, simulation as an approach to training managers has wider and growing importance to all types of organizations. Students are provided with realistic problem-solving situations involving boards of directors, community resources, public policy issues, state and federal agencies, labor unions, and changing economic conditions.

663 History of Contemporary Management Thought Fall. 3 credits.

W. Wolf.

A critical review of the works of the major contributors in terms of the development of their ideas and their impact. Tape recorded interviews with Barnard, Simon, Drucker, Urwick, and others are studied.

665 Case Studies in Personnel Administration Fall. 3 credits.

F. Foltman, G. Milkovich, W. Wasmuth.

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.

666 Administrative Theory and Practice Spring. 3 credits. Prerequisites: advanced undergraduates, I&LR 120–121 or its equivalent and permission of instructor; graduate students, I&LR 520 or permission of instructor.

W. Wolf.

A general survey of the theory and practice of administration. Attention focuses on organizational differentiation and its implication for managerial practices. Taught around cases and field studies. Topics include theories and approaches to administration, organizational diagnosis, managerial practices, and organizational dynamics.

668 Staffing: Employee Selection and Utilization Fall. 3 credits. Prerequisites: I&LR 260 or equivalent and one semester of statistics; working knowledge of factor analysis, item analysis, regression analysis, and ANOVA.

L. Dyer, R. Eder.

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 Spring. 3 credits. Prerequisite: I&LR 260 or equivalent. Limited enrollment.

L. Dyer, G. Milkovich, R. Risley.

The development and administration of wage and salary programs. Major emphasis is given to the role of compensation in attracting, retaining, and motivating employees. Topics investigated include motivation theory, factors influencing compensation levels, job evaluation, forms of compensation, including incentive plans and fringe benefits, special issues of managerial compensation, and problems of compensation control.

690 Top Management Personnel Strategies and Policies Spring. 3 credits.

W. Wolf.

Personnel management policies and strategies from the perspective of top management. Vice presidents of personnel of major United States corporations are invited as guest lecturers, providing students with an opportunity to get to know these people and to find out what they and their companies are doing. Areas covered include the job of the top personnel officer, formal and informal organization relative to managing the personnel function, current issues, and problems of top-level personnel managers.

691 Human Resource Planning Spring. 4 credits. Prerequisites: I&LR 260 or 560 or the equivalent and one course in statistics. Enrollment limited to 24.

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.

692 The Appraisal and Diagnosis of Organizations Fall. 3 credits. Prerequisite: I&LR 120 and 260.

W. Wolf.

This seminar focuses upon the understanding of organizations in a holistic framework. It deals with the process of diagnosis, techniques for gathering data, analysis of the functional areas of management, and interpretation and synthesis of findings. Field study and laboratory training are emphasized. The point of view taken is that of the administrator or consultant.

693 Design and Administration of Training Programs Fall. 3 credits. Limited to 25 students. Prerequisites: I&LR 260 or equivalent and permission of instructor.

F. Foltman, W. Frank.

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.

694 Seminar on the Theory and Practice of Organization Development Spring. 3 credits.

W. Wolf.

Organization practices for self-renewal and conflict management. The point of view taken is that of a third party interventionist and the course focuses on techniques for diagnosis and treatment of organizational problems. Topics include: the third party's role and entry dynamics; clinical diagnosis of functioning organizations; confrontation; goal setting; mirror exercises; force field analysis; team building exercises; structural changes and job design issues. Emphasis is on experimental learning.

696 Personnel Administration and Government Regulations Fall. 3 credits.

R. Risley.

A survey and analysis of government regulations affecting personnel management in nongovernment organizations, examining the framework within which management must operate. Government agencies' methods of enforcement of such regulations and the firm's responsibilities for failure to comply with these legal requirements are considered.

761 Human Resource Economics and Public Policy Fall. 3 credits.

V. Briggs.

A review of contemporary labor market trends and theories pertaining to labor market intervention through public policy measures. Changes in the "older" programs of apprenticeship, vocational education, and vocational rehabilitation as well as the "new" programs of the "post CETA era" are studied. Special policy issues pertaining to youth, rural workers, welfare reform, public service employment, and worker relocation will be examined. Comparison will also be made with European initiatives.

798 Internship For course description, see p. 294.

799 Directed Studies For course description, see p. 294.

Interdepartmental Courses

150 Labor Problems in American Society Fall or spring. 3 credits.

R. Aronson, O. Mitchell.

A survey for students in other divisions of the University. An analysis of the major problems in industrial and labor relations; labor union history, organization, and operation; labor market analysis and employment practices; industrial and labor legislation and social security; personnel management and human relations in industry; collective bargaining and the settlement of industrial disputes; and the rights and responsibilities of employers and employees.

151 Personnel Management for Managers Fall and 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.

650 Human Resource and Collective Bargaining Problems in the Construction Industry Spring. 3 credits. Open to seniors and graduate students, and non-ILR students with permission of the instructor.

D. Cullen, F. Foltman.

Selected human resource and collective bargaining problems in the construction industry are examined, such as supply and demand of construction manpower; black workers and the building trades; skilled human resource forecasting and planning; skill requirements; education and training; personnel management policies and practices; the wage-price issue; the closed shop; featherbedding; jurisdictional disputes; and problems of bargaining structure. Individual research is required.

ILR Extension

New York City

The following courses are open only to participants in the Extension Division in New York City. These courses are not open to undergraduate or graduate students matriculated in the Ithaca ILR programs.

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 of the 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.

Faculty Roster

- Aldrich, Howard E., Ph.D., U. of Michigan. Prof., Organizational Behavior
- Aronson, Robert L., Ph.D., Princeton U. Prof., Labor Economics
- Bacharach, Samuel, Ph.D., U. of Wisconsin. Assoc. 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
- Briggs, Vernon M., Jr., Ph.D., Michigan State U. Prof., Personnel and Human Resource Studies
- Burton, John F., Jr., Ph.D., U. of Michigan. Prof., Collective Bargaining, Labor Law, and Labor History; Labor Economics
- Butler, Richard J., Ph.D., U. of Chicago. Asst. Prof., Labor Economics
- Clark, M. Gardner, Ph.D., Harvard U. Prof., Labor Economics; International and Comparative Labor Relations
- 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
- Eder, Robert W., Ph.D., U. of Colorado. Asst. Prof., Personnel and Human Resource Studies
- Ehrenberg, Ronald, Ph.D., Northwestern U. Prof., Labor Economics
- Farley, Jennie T., Ph.D., Cornell U. Asst. Prof., Extension
- Fields, Gary S., Ph.D., U. of Michigan. Assoc. Prof., Labor Economics
- Foltman, Felician F., Ph.D., Cornell U. Prof., Personnel and Human Resource Studies
- Francis, Ivor S., Ph.D., Harvard U. Assoc. Prof., Economic and Social Statistics
- Frank, William W., Ph.D., Michigan State U. Prof., Extension; Personnel and Human Resource Studies
- Galenson, Walter, Ph.D., Columbia U. Jacob Gould Schurman Professor, Labor Economics; International and Comparative Labor Relations
- Gold, Michael E., L.L.B., Stanford U. Asst. Prof., Collective Bargaining, Labor Law, and Labor History
- Gray, Lois S., Ph.D., Columbia U. Prof., Extension
- Gross, James A., Ph.D., U. of Wisconsin. Prof., Collective Bargaining, Labor Law, and Labor History
- Gruenfeld, Leopold W., Ph.D., Purdue U. Prof., Organizational Behavior
- Hammer, Tove H., Ph.D., U. of Maryland. Assoc. Prof., Organizational Behavior
- Hanslowe, Kurt, J.D., Harvard U. Prof., Collective Bargaining, Labor Law, and Labor History
- Hutchens, Robert M., Ph.D., U. of Wisconsin. Assoc. Prof., Labor Economics
- Kaufman, Jacob J., Ph.D., Columbia U. Prof., Extension
- Kelly, Matthew A., Ph.D., Princeton U. Prof., Extension; Collective Bargaining, Labor Law, and Labor History
- Kennedy, Marian, J.D., U. of Santa Clara. Asst. Prof., Collective Bargaining, Labor Law, and Labor History
- Kirmeyer, Sandra, Ph.D., Claremont Graduate School. Asst. Prof., Personnel and Human Resource Studies
- Korman, A. Gerd, Ph.D., U. of Wisconsin. 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
- 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
- Mueller, Susan J., Ph.D., Cornell U. Asst. Prof., Personnel and Human Resource Studies
- 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
- Rosen, Ned A., Ph.D., Purdue U. Prof., Organizational Behavior
- Ross, Philip, Ph.D., Brown U. Prof., Collective Bargaining, Labor Law, and Labor History
- Salvatore Nicholas, Ph.D., College of Holy Cross. 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. Assoc. Prof., Labor Economics
- Stern, Robert N., Ph.D., Vanderbilt U. Assoc. Prof., Organizational Behavior
- Trice, Harrison M., Ph.D., U. of Wisconsin. Prof., Organizational Behavior
- Velleman, Paul F., Ph.D., Princeton U. Assoc. Prof., Economic and Social Statistics
- Wasmuth, William J., D.B.A., Indiana U. Prof., Extension; Personnel and Human Resource Studies
- Wertheimer, Barbara M., M.A., New York U. Assoc. Prof., Extension
- Whyte, William F., Ph.D., U. of Chicago. Prof., Organizational Behavior; International and Comparative Labor Relations
- Williams, Lawrence K., Ph.D., U. of Michigan. Prof., Organizational Behavior
- Windmuller, John P., Ph.D., Cornell U. Prof., Collective Bargaining, Labor Law, and Labor History; International and Comparative Labor Relations
- Wolf, William B., Ph.D., U. of Chicago. Prof., Personnel and Human Resource Studies

Law School

Administration

Peter W. Martin, dean of the law faculty
 Albert C. Neimeth, associate dean for placement and alumni affairs
 John Lee Smith, dean of students
 Anne Lukingbeal, assistant dean for admissions and financial aid
 Jane L. Hammond, law librarian
 Daniel J. Freehling, assistant law librarian
 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 (J.D.) "with specialization in international affairs."

There are combined graduate degree programs with the Graduate School of Business and Public Administration, the College of Arts and Sciences, the Department of City and Regional Planning, and the School of Industrial and Labor Relations, as well as a special opportunity for highly qualified undergraduates in the College of Arts and Sciences to register in the Law School during their senior year.

The graduate program of the Cornell Law School is a small one, to which only a few students are admitted each year. The LL.M. degree (Master of Laws, Legum Magister) and the J.S.D. degree (Doctor of the Science of Law, Jurisprudentiae Scientiae Doctor) are conferred. A small number of law graduates may also be admitted as special students, to pursue advanced legal studies without being degree candidates.

For further information, refer to the *Announcement of the Law School*, obtainable from the Director of Admissions, Myron Taylor Hall.

First-Year Courses

- 500 Civil Procedure
- 502 Constitutional Law
- 504 Contracts
- 506 Criminal Justice
- 508 Practice Training I
- 509 Practice Training II
- 512 Property
- 515 Torts

Second-Year Electives

- 550 Accounting for Lawyers
- 552 Agency and Partnership
- 554 Commercial Law
- 558 Corporations
- 562 Enterprise Organization
- 564 Evidence
- 567 Federal Income Taxation
- 569 Process of Property Transmission
- 571 Trusts and Estates I

Second- and Third-Year Electives

- 600 Administrative Law
- 602 Admiralty
- 604 American Legal History
- 608 Antitrust Law
- 612 Civil Rights
- 614 Comparative Law
- 616 Conflict of Laws
- 619 Criminal Procedure: From Indictment to Sentence
- 620 Criminal Procedure: Investigation
- 623 Debtor-Creditor Law
- 626 Environmental Law
- 628 Estate and Gift Taxation
- 632 Family Law
- 635 Federal Courts
- 640 International Law
- 645 Labor Law
- 648 Land Financing
- 660 Land-Use Planning
- 662 Law and Medicine
- 664 Law Practice Dynamics
- 666 Law, Society, and Morality
- 668 Lawyer as a Negotiator
- 670 Lawyers and Clients
- 672 Legislation
- 674 Local Government
- 676 Professional Responsibility
- 678 Regulated Industries
- 682 Securities Regulation
- 685 Taxation of Corporations and Shareholders

- 687 Taxation of Partnership Income
- 689 The International Economic Order
- 690 Trial Advocacy
- 692 Unfair Trade Practices
- 696 Welfare Law

Problem Courses and Seminars

- 700 Advanced Antitrust Law and Policy
- 702 Advanced Civil Procedure
- 704 Advanced Labor Law
- 710 Children's Rights
- 712 Civil Rights
- 715 Comparative Labor Law
- 718 Constitutional Criminal Procedure
- 720 Contemporary Legal Theory
- 722 Copyright, Trademark, and Patent Law
- 725 Corporate Practice
- 726 Courts and Politics
- 728 Equal Protection Seminar
- 730 Estate Planning
- 742 International Energy Law—Selected Problems
- 745 Jurisprudence of Felix Frankfurter and Hugo Black
- 748 Juvenile Justice
- 750 Labor Arbitration Seminar
- 755 Law and Social Change in Early Modern England
- 757 Legal Aid I
- 758 Legal Aid II
- 762 Legal Process
- 764 Legislative Process
- 765 Nonprofit Institutions
- 768 Postconviction Proceedings
- 770 Practice Ethics
- 772 Prisoners' Legal Services Clinic
- 778 Remedies
- 780 Science, Technology, and Law
- 782 Sex Equality Seminar

Faculty Roster

Aman, Alfred C., Jr., J. D., U. of Chicago. Assoc. Prof.
 Barceló, John J., III, S.J.D., Harvard U. Prof.
 Clermont, Kevin M., J.D., Harvard U. Prof.
 Cramton, Roger C., J.D., U. of Chicago. Prof.
 Curtiss, W. David, LL.B., Cornell U. Prof.
 Dean, William T., J.D., U. of Chicago. Prof.
 Gunn, Alan, J.D., Cornell U. Prof.
 Hammond, Jane L., J.D., Villanova U. Prof.
 Hanslowe, Kurt L., J.D., Harvard U. Prof.
 Hay, George A., Ph.D., Northwestern U. Prof.,
 Law/Economics
 Henn, Harry G., J.S.D., New York U. Edward Cornell
 Professor of Law
 Jacobs, James B., Ph.D., U. of Chicago. Assoc. 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. Asst. Prof.
 Osgood, Russell K., J.D., Yale U. Assoc. Prof.
 Palmer, Larry I., LL.B., Yale U. Prof.
 Ratner, David L., LL.B., Harvard U. Prof.
 Roberts, Ernest F., LL.B., Boston Coll. Edwin H.
 Woodruff Professor of Law
 Rossi, Faust F., J.D., Cornell U. 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.
 Younger, Judith T., J.D., New York U. Prof.

Division of Nutritional Sciences

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. Ambruster, R. E. Austic, D. Bauman, A. Bensadoun, C. A. Bisogni, M. Brink, T. C. Campbell, G. F. Combs, W. L. Dills, A. Gillespie, J. D. Haas, J.-P. Habicht, R. Holmes, M. Immink, M. Kazarinoff, R. Klippstein, L. P. Krook, J. M. Koch, S. Kumanyika, C. Lanciault, M. C. Latham, D. A. Levitsky, B. A. Lewis, M. Mapes, D. Miller, N. Mondy, C. Olson, R. Parker, N. Peckenpaugh, M. Pimentel, J. M. Rivers, D. A. Roe, D. Sanjur, R. Schwartz, M. Stipanuk, E. Thorbecke, V. Utermohlen, D. VanCampen, P. J. VanSoest, R. G. Warner, R. H. Wasserman, R. J. Young, D. B. Zilversmit

The Division

The field of nutrition is complex, with a breadth that ranges from the subcellular chemistry of nutrients to the economic policies that determine world food supplies. At Cornell, the intricate relationships of food, diet, and health are studied in the Division of Nutritional Sciences. The division, which bridges the College of Human Ecology and College of Agriculture and Life Sciences, brings together specialists from the physical, biological, and social sciences to form one of the most complete nutrition programs in the country. Dedicated to both the discovery and application of knowledge, the faculty in the division conduct undergraduate and graduate teaching; public service, primarily through Cooperative Extension; and research programs in many aspects of human nutrition.

Most undergraduates who major in nutrition are admitted through the College of Human Ecology and must meet the admission and graduation requirements of that college. Undergraduates in the College of Agriculture and Life Sciences may also develop a nutritional sciences concentration through the general studies program. Courses in the division may be used to meet graduation requirements in both colleges.

The undergraduate major, combining basic and professional courses, offers students several career options after graduation. Students are trained for a variety of entry-level positions in nutrition and health, including laboratory research, consumer affairs, nutrition education, and community service. A dietetic internship is another route open to nutrition majors. All students graduate with a solid foundation for advanced study, and many continue in such fields as nutrition, food science, medicine, other health sciences, biological sciences, education, and social services. A nutritional sciences concentration can also be combined with other majors in human ecology or agriculture and life sciences.

The Major

All nutritional science majors essentially spend their first two years meeting common core requirements in the sciences and humanities. There is some choice among the required basic sciences, depending on the student's background and career goals, but choices usually include general and organic

chemistry, general biology, biochemistry, and microbiology. Introductory courses in food and nutrition and in economics, sociology, or psychology are required as well.

The mathematics requirement is based on the results of the Cornell mathematical test, which all entering students take during orientation week. Students who have high scores on this test are not required to take additional courses in mathematics.

By their junior year, students take the more specialized courses recommended for the five major emphases described below. The common core ensures that they can move into any emphasis, or change emphases, while it provides the foundation for advanced work in foods or nutritional science.

Foods. Students who elect this emphasis concentrate on basic and applied science courses, including physiochemical aspects of food and laboratories in experimental methods. They study the composition and treatment of food and how these affect food quality, safety, acceptability, and nutritive value.

Consumer food and nutrition. This emphasis prepares students to apply the nutritional and food sciences to consumers' questions about food quality, safety, cost, and nutritive value. Course work in communications, economics, government, public policy, and marketing is added to the nutritional sciences core.

Community nutrition. This emphasis 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.

Clinical nutrition. This emphasis 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.

Nutritional biochemistry. This basic science-oriented curriculum prepares students for advanced study in the nutritional and biomedical sciences. Students who want to explore more broadly the scientific basis of food and nutrition may decide 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.

Students with interests in the field of applied nutrition should consider fulfilling the requirements for membership or registration (or both) in the American Dietetic Association (ADA). To do this, students must complete courses in the basic requirements and one area of specialization. The areas of specialization include general dietetics, management, clinical nutrition, and community nutrition.

Evaluation of academic qualifications for membership in the ADA should be completed prior to graduation. Seniors should initiate this academic evaluation process in March if they will be graduating the following January, and in September if they will be graduating the following May. All students who will complete the academic requirements by graduation should participate in the evaluation process while at Cornell. Students who meet most but not all of the academic requirements are encouraged to have their academic work evaluated so that deficiencies can be identified and documented. Additional information about the dietetic programs at Cornell may be obtained from Rose Marie Holmes, 314 Martha Van Rensselaer Hall, and Joan M. L. Koch, 373 Martha Van Rensselaer Hall.

The core and professional courses required in each emphasis represent the minimum course work. In general, more course work will be necessary in the sciences and in food and nutrition for specific career goals. Many graduate schools require a year of college mathematics, biology, physics, and organic chemistry for entrance. Students interested in preparing for medical careers should consult the University's Health Careers Office.

Academic Advising

Every nutritional sciences major is assigned a faculty adviser from the Division of Nutritional Sciences, and an effort is made to match the professional interests of students and adviser. If the student's interests change, he or she may change advisers.

Advising clinics are held during course registration each semester to help students plan their programs of study. Regular conferences with the faculty adviser are *required* at least twice a year. The adviser not only helps to plan course work, but also can help students identify special experiences and career choices. 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.

Questions about the advising system and about the undergraduate major in nutritional sciences should be addressed to Marjorie Devine, associate director for academic affairs, 334 Martha Van Rensselaer Hall.

Special Opportunities

The division's Learning Resources Center, featuring a reading room and audio-visual materials on a great variety of nutrition topics, is open weekdays for use by individuals or groups. These materials are useful to supplement class work, for special projects, or for independent study. In cooperation with a faculty member, students may earn credit for developing audiovisual presentations on selected topics.

Undergraduate students are often able to work closely with faculty members on laboratory projects or in field research. Independent study courses (Directed Readings, Empirical Research, or Supervised Fieldwork) provide more diverse or intensive experience than can be gained in the classroom.

Field experience can be arranged through independent study, as a class project (Nutritional Sciences 302, 445), or as a summer field study, for two or more credits. Students specifically interested in fieldwork in community nutrition should contact the Division of Nutritional Sciences field study coordinator, or Shiriki Kumanyika, assistant professor of community nutrition.

Honors Program

The honors program, leading to a bachelor of science degree with honors in nutritional sciences, is designed to challenge the academically talented undergraduate. Students are expected to evaluate research findings and design an independent project. They are given the opportunity to do an independent piece of research, which may be empirical or may deal with policy and program development.

The honors committee considers applications from sophomores majoring in nutrition during the spring semester of each year. Criteria for selection include scholastic achievement in the sciences and professional courses, cumulative grade point average, and motivation for independent study. Other students, including those transferring to a nutrition major as juniors, are considered upon written request. The deadline for entry into the program is the beginning of the second semester of the junior year.

Courses Recommended for Nonmajors

Courses in the division are open to all students of the University. For nonmajors, courses in nutritional science can strengthen preparation for careers in biological science, medicine, agriculture, food science, human services, and other fields.

Introductory courses in nutrition (Nutritional Sciences 115) and food (Nutritional Sciences 146), as well as 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) are open to all students. Nonmajors who have taken college courses in chemistry, biological sciences, and nutritional sciences may elect advanced food and nutrition courses.

Graduate Programs

Graduate study is administered by the graduate 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 human nutrition, animal nutrition, international nutrition, foods, nutritional biochemistry, or general nutrition. A professional Master of Nutritional Sciences (M.N.S.) degree in clinical nutrition combines academic study on campus with clinical training at affiliated institutions.

The specialties and interests represented in the Field of Nutrition provide almost unlimited opportunity for graduate study. Cornell's extensive laboratory and agricultural facilities ensure that students in experimental nutrition have exceptional choice and thorough training. There are opportunities to work with community and federal agencies, which broaden the human nutrition major; and students in international nutrition are expected to conduct their dissertation projects abroad.

More-detailed information about the graduate degrees is found in the brochure *Graduate Study in Nutrition*, available from the Graduate Faculty Representative, Field of Nutrition, Savage Hall, Cornell University, Ithaca, New York 14853.

Nutritional Sciences Courses

115 Ecology of Human Nutrition and Food Fall and spring. 3 credits. Prerequisites: fall: high school biology (juniors and seniors with advanced biological science background must have permission of the instructor); spring: a one-semester college biology course or permission of the instructor. S-U grades optional. Cost of handouts and pamphlets, \$3.

Fall: M W F 9:05; spring: M W F 11:15. Discs scheduled in place of some lec's. Students should have one of the following times free: W 4:25, W 7 p.m., R 3:35, R 4:25, or F 12:20. Evening prelims 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 the attainment of health. Discussion of current issues, such as vegetarianism, weight control, and dietary goals, is included.

146 Introductory Foods Fall and spring. 3 credits. Each section limited to 16 students. Prerequisite: NS 115 or concurrent registration and permission of instructor during course registration (permission-

of-instructor forms must be obtained from and returned to 335 Martha Van Rensselaer Hall). Cost of handouts, \$2.

Fall: lec, M 12:20; labs, T R 10:10–12:05 or 2:30–4:25. Spring: lec, M 10:10; labs, W F 10:10–12:05 or T R 10:10–12:05 or T R 2:30–4:25. M. Pimentel.

Criteria for evaluating the practice of the science of food and nutrition. Lab includes an introduction to the physiochemical properties of food and the relationship of these properties to preparation, techniques, and food quality. 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. V. Utermohlen. 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 Physicochemical 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. Labs 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 (also Food Science 301) Nutritional Aspects of Raw and Processed Foods Spring. 3 credits. Prerequisite: NS 115 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, including food processing methods, dietary trends, vegetarian diets, fabricated foods, fast foods, and food additives, will be discussed in the context of their potential impact on nutrition and health.

302 Orientation to Field Study in Extension Fall. 2 credits. Limited to 10 juniors and seniors. Prerequisites: NS 115, 146, and permission of instructor. S-U grades only.

F 12:20–2:20; field trips to nearby counties are arranged as student schedules permit. R. Klippstein.

The selection and preparation of appropriate food and nutrition information for specific lay audiences. Participants complete an individual project using two different mass-medium teaching tools. When appropriate, the project is taught to established

county audiences. The major project is a group project presenting programs to a scheduled extension audience. Additional experiences include a field visit to a county extension office and review of extension organization and resources. Understanding the needs of audiences, informal teaching techniques, and self-critiquing and group critiquing are stressed.

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 and T. C. Campbell. The biochemical and physiological bases for human nutrition requirements, including digestion and absorption, energy metabolism, food intake regulation, protein amino acids, minerals, vitamins, and determination of nutritional status.

332 Laboratory Methods in Nutritional Sciences Fall and spring. 3 credits. Each section limited to 18 students. Prerequisites: NS 331 or concurrent registration and permission of instructor during course registration (permission-of-instructor forms must be obtained from and returned to 335 Martha Van Rensselaer Hall).

Lec, R 9:05; labs, M W 1:25–4 or T R 1:25–4. M. Stipanuk.

Introduction to principles and procedures of experimental design, analytical techniques, and data analysis in human nutrition. Emphasis on methods of analysis of nutrients and metabolites in food, tissues, and body fluids. Application of these methods in assessing physiological and biochemical responses to alterations of nutrient intake in animal and human studies.

346 Consumer Food Issues Fall. 2 credits. Limited to 30 juniors and seniors. Prerequisites: NS 115 and 146 or permission of instructor. S-U grades optional.

T R 12:20. C. Bisogni. An examination of selected consumer issues related to the availability, safety, and quality of food. Current legislative and regulatory proposals will be investigated in terms of relevant research and potential impact on consumers and the food supply.

347 (also HDFS 347) Human Growth and Development: Biological and Social Psychological Considerations Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent; HDFS 115 or Psychology 101 and NS 115 or equivalent.

M W F 1:25. J. Haas and 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 (also Psychology 361) Biochemistry and Human Behavior 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 Food-Service

Operation Spring. 4 credits. Prerequisites: NS 246, Agricultural Economics 220, Hotel Administration 211 or I&LR 121 or I&LR 151 or I&LR 260 or I&LR 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 food-service operations involved in production, distribution, and service of quality food in quantity. Includes menu planning, food-service layout and design, production and service controls, purchasing, food cost control, personnel management, sanitation, and safety.

398 Honors in Nutritional Sciences

Fall. 1 credit. Limited to students admitted to the division honors program. S-U grades only.

T 2:30. M. Morrison, coordinator.

Research design. Delineation of honors research problem in consultation with a faculty adviser.

400–401–402 Special Studies for

Undergraduates Fall or spring. Credit 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.

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. J. Rivers.

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. Each lab limited to 10–20 students. Prerequisites: NS 146, concurrent registration in NS 441 (or equivalent

background in either course). Limited enrollment. 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 or T 2:30–4:25. Evening prelims to be arranged.

C. Lanciault.

Development of skills in formulation and analysis of therapeutic dietary regimes. Various sources of information of food composition, diet planning, and enteral and parenteral nutrition supplements are used.

445 Community Nutrition and Health

Spring. 3 credits. Prerequisites: NS 331 or concurrent enrollment in 331. Recommended: NS 325. S-U grades optional. The field project component of this course may involve off-campus activity; students are responsible for their own transportation or bus fare.

Lec-discs, M W 11:15; fieldwork lab, W 2:30–4:30.

S. Kumanyika.

Study of human nutrition and health problems from a community perspective; programs and policies related to nutrition at local, state, and federal levels; approaches and techniques of effective application and dissemination of nutrition knowledge in communities.

446 Physiochemical Aspects of Food

Fall. 3 credits. Prerequisites: NS 246 and a college course in biochemistry, which may be taken concurrently. S-U grades optional.

M W F 9:05. G. Armbruster.

The relation of food quality to (a) rheological properties of food systems, (b) oxidation and reduction reactions, and (c) enzymatic and nonenzymatic browning. Covers physical and chemical factors accounting for the color, flavor, and texture of natural and processed foods.

447 Physiochemical Aspects of Food—

Laboratory Fall. 1 credit. Limited to 16 students. Prerequisite: NS 446 or concurrent registration. S-U grades optional.

T 1:25–4:25. G. Armbruster.

Laboratory experiments designed to illustrate the effect of varying ingredients and treatment on the quality of food products. Objective testing methods are used to determine food quality characteristics.

448 Physiochemical Aspects of Food—

Laboratory Fall. 1 credit. Limited to 16 students. Prerequisite: NS 446 or concurrent registration. S-U grades optional.

R 1:25–4:25. G. Armbruster.

Laboratory experiments designed to illustrate (a) the physiochemical behavior of colloidal systems, (b) chemical reactions of some food components, and (c) effects of temperature, pH, moisture, inorganic salts, and enzymes on physiochemical changes in natural foods, food components, and food mixtures.

456 Experimental Foods Methods

Spring. 3 credits. Limited to 16 students. Prerequisites: NS 446, 448, and a course in statistics recommended.

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 Food-Service Systems

Fall and spring. 3 credits. Limited to 30 students a semester. Prerequisite or corequisite: NS 378 and permission of instructor before course registration. S-U grades optional. Estimated cost, \$5.

Lec, T 9:05; one sec, M–F 2:30–7; plus four 7–9 p.m. sessions to be arranged in place of lab when necessary. Possible field trip. J. M. L. Koch.

Lab is arranged through Cornell Dining. Other experiences may be possible in community food-service operations. Students will gain experience in care and use of institutional equipment, job analysis, volume food production, applied sanitation, and recipe development and evaluation as well as other management skills required to operate a food-service 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.

499 Honors Problem

Fall and spring. Credit to be arranged. Open only to students in the division honors program.

Hours to be arranged. Division faculty; M. Morrison, coordinator.

An independent literature, lab, 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 (also Animal Science 601) Proteins and

Amino Acids in Nutrition Fall. 3 credits.

Prerequisites: courses in physiology, biochemistry, and nutrition or permission of instructors.

M W F 11:15. R. E. Austic, M. A. Morrison.

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. Discussion includes current topics in protein and amino acid nutrition, nutritional interrelationships, amino acid and protein requirements, evaluation of protein quality, and bioavailability of amino acids. 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 Spring. 2 credits.

Prerequisite: full-year 400-level course in biochemistry or equivalent. S-U grades optional. Offered alternate years.

T R 11:15. C. Wilkinson, C. Campbell, A. Aronson, and others.

A study of fundamental biochemical mechanisms of absorption, transport, metabolism, and excretion of drugs, carcinogens, and toxicants. Emphasis on oxidative and conjugative pathways of metabolism and of environmental and nutritional factors that influence toxicant metabolism and disposition. Methods of evaluating *in vivo* and *in vitro* metabolism.

612 Methods of Assessing Physical Growth in Children Spring. 2 credits.

Limited to graduate students and students who have permission of the instructor. S-U grades optional.

Lec, T 1:25; labs, T R 1:25-4:25. J. Haas.
A lab 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 physiological responses to environmental stress.

613 Obesity and the Regulation of Body Weight Spring. 3 credits.

Limited to 30 students. Prerequisites: one course in psychology, one course in nutrition. Undergraduate students may register with permission of the instructor. Offered alternate years.

M W F 11:15. D. Levitsky.
This course is a multidisciplinary discussion of the causes, effects, and treatments of human obesity. Topics include the biopsychology of eating behavior, genetics of obesity, role of activity and energy metabolism, psychosocial determinants of obesity, anorexia nervosa, therapy and its effectiveness, social discrimination.

616 Readings in Food Fall. 2 credits. Prerequisite: organic chemistry. Recommended: biochemistry. S-U grades optional. May be repeated for credit with permission of instructor.

W 7:30-9:25 p.m. N. Mondy.
Critical review of selected topics in the current literature. Emphasis on experimental data and basic scientific principles underlying modern theory and practice relative to food quality.

617 Teaching Seminar First half of semester during fall or spring. 1 credit. Limited to division graduate students and students who have permission of the instructor. S-U grades only.

W 7:30-9:30 p.m. M. Devine and N. Yaghlian.
A series of workshops focusing on development of teaching skills for guiding classroom learning in lec, disc, and lab 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.

Noncredit. Limited to division graduate students and students who have permission of the instructor.

Hours to be arranged. Division faculty; M. Devine, coordinator.
Designed to provide experience in teaching nutritional sciences by direct involvement in college courses under supervision of a faculty member. The aspects of teaching and the degree of involvement vary depending on the needs of the course and the experience of the student.

619 (also Animal Science 619) Field of Nutrition Seminar Fall or spring. Noncredit. S-U grades only.

M 4:30. Faculty and guest lecturers.
Lectures on current research in nutrition.

625 Seminar in Food Habits Research Fall.

3 credits. Limited to 12 graduate students. Prerequisite: statistics or research design course. Offered alternate years.

W F 3:35. D. Sanjur.
Emphasizes a critical review of the literature and development of a research proposal using sociological theories and techniques as applied to nutritional data.

626 Special Topics in Food Spring. 2 credits.

Hours to be arranged. G. Armbruster and 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 7:20-9:25 p.m. N. Mondy.
Current research related to food production and processing will be reviewed. May be repeated for credit with permission of instructor.

630-633 Advanced Nutrition Laboratory Spring.

1-5 credits. Limited to 12 students. T R 2:15-5:15. Division faculty.
Study of the anthropometric, dietary, clinical, and biochemical assessment of human nutritional status. The individual courses are taught in sequence over the entire semester. Any or all of the modules may be taken for credit.

630 Anthropometric Assessment 1 credit.

Prerequisites: NS 331 or equivalent and permission of instructor.
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.

D. Sanjur.
Study of methods and techniques for assessing dietary intakes at the individual and household levels.

632 Clinical Assessment 1 credit. Prerequisites: NS 630, 631, 441, Biological Sciences 330 or 331, and either NS 332 or Biological Sciences 430, and permission of instructor.

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.

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 (also Biological Sciences 634) Vitamins and Coenzymes Spring. 2 credits.

Prerequisites: organic chemistry 253 or 357-358 and Biological Sciences 331 or 330, or their equivalents in biochemistry. Offered alternate years. T R 10:10. M. N. Kazarinoff.
The chemical, biochemical, and nutritional aspects of the vitamins and coenzymes.

635 (also Biological Sciences 635) Enzymology and Metabolic Regulation Spring. 2 credits.

Prerequisites: Chemistry 357-358 and either Biological Sciences 330 or 331 or permission of the instructor. Recommended: physical chemistry. T R 9:05. W. L. Dills and division faculty.
Lectures only. The study of enzymes and the molecular mechanisms of metabolic regulation.

636 (also Biological Sciences 637) Integration and Coordination of Energy Metabolism Fall.

3 credits. Prerequisites: Biological Sciences 330 and 331, or equivalent.

M W F 9:05. W. J. Arion and staff. Evening prelims, hours to be arranged.

The elements of energy homeostasis are developed through correlations of the structural, functional, and metabolic characteristics of the major animal tissues and organs. Mechanisms which 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 Fall. 2 credits.

Limited to graduate students. Prerequisites: Statistics and Biometry 602 or 604 or equivalent; NS 331, 441, 601, 603, 630, and 631, or equivalent, and permission of instructor. S-U grades optional.

Hours to be arranged. J-P. Habicht.
In the context of designing and evaluating population interventions to improve protein-calorie nutrition, students (a) review past evidence of effectiveness and efficiency of intervention, (b) attempt to quantify sensitivity and specificity of outcome measures, and (c) design methods to improve interventions and evaluations.

638 Epidemiology of Nutrition Spring. 2 credits.

Limited to graduate students. Prerequisites: Statistics and Biometry 602 or 604 or equivalent; NS 331, 441, 601, 603, 630, and 631, or equivalent, and permission of instructor. S-U grades optional.

Hours to be arranged. J-P. Habicht.
In the context of designing national nutrition surveillance, students review (a) principles underlying surveillance, (b) prerequisites of indicators, and (c) current surveillance proposals to identify strengths and weaknesses. The role of evaluation of programs in nutrition surveillance also is reviewed.

645 Seminar on United States Nutritional Services and Programs Spring. 2 credits.

Limited to graduate students with a major or minor in human nutrition. S-U grades optional.

M W F 11:15. S. Kumanyika.
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 Spring. 3 credits.

Prerequisite: a college course in organic chemistry or biochemistry. S-U grades optional.

T R 9:05; disc to be arranged.

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

Fall, 3 credits. Prerequisite: NS 331 or equivalent.

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, weeks 1-7.

2 credits. Limited to students in the Clinical Nutrition Program. Prerequisites: NS 441, 442, and permission of instructor. S-U grades only.

Hours to be arranged. C. Lanciault.

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 (also Veterinary Medicine 759) The Nutrition and Physiology of Mineral Elements Fall.

2 credits. Prerequisites: basic physiology, intermediate biochemistry, and general nutrition.

T R 8. R. Schwartz, D. VanCampen, R. Wasserman. Lectures on nutritional aspects and physiological, biochemical, and hormonal relationships of the prominent macro- and micro-elements, with emphasis on recent developments. Included is information on methodologies of mineral research and the chemistry of ions and complexes as well as essentiality, requirements, transport, functions, homeostasis, interrelationship, and toxicity of various mineral elements.

660 Special Topics in Nutrition Fall or spring.

3 credits maximum each term. Registration by permission of the instructor.

Hours to be arranged. Division faculty.

Designed for the student who wants to become informed in any specific topic related directly or indirectly to nutrition. The course may include individual tutorial study, experience in research laboratories, a lecture series on a special topic selected by a professor or a group of students, and/or selected lectures of another course already offered. Topics may be changed so that the course may be repeated for credit.

669 Field Seminar Spring; offered during

January intersession or immediately following final examinations spring semester. 1 credit. Limited to 12 students. Required for graduate students in clinical nutrition. Open to other graduate students in nutrition with permission of instructor.

J. Rivers and M. Devine.

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, N.Y. (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.

C. Lanciault, R. Holmes, V. Utermohlen, and

J. Rivers.

The delivery of nutritional care in hospitals, outpatient clinics, and community settings.

680 International Nutrition Problems, Policy and Programs Fall, 3 credits. Prerequisite: permission of instructor.

T R 11:15-12:30. M. Latham.

Designed for graduate students who want to learn about the important nutritional problems of developing countries. The major forms of malnutrition related to poverty and their underlying causes are discussed. Emphasis is placed on programs and policies that can assist poor countries and communities to improve their nutritional and health status.

690 (also Psychology 690) Seminar on Nutrition and Behavior Spring, 2-4 credits. Limited to 25 students. Prerequisite: Psychology and NS 361 and permission of the instructor. S-U grades optional.

T R 10:10-11:25. D. Levitsky.

The seminar this year covers several current topics in nutrition and behavior. These topics include: early nutritional insult and mental development, malnutrition and behavior, nutrition and learning, food additives and hyperkinesis, megavitamin therapy, inborn metabolic defects and mental illness, nutrition and depression, and hypoglycemia.

695 Seminar in International Nutrition and Development Policy Spring, 2 credits. Prerequisite:

NS 680 or equivalent. S-U grades optional.

T R 10:10-12. 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 Fall or

spring. No credit. S-U grades only.

M 12:20. T. C. Campbell and C. F. Wilkinson.

One-half of meetings on general topics in toxicology with the other half on nutrition and cancer. The toxicology seminar program covers varied topics in biochemical, genetic, nutritional, and veterinary toxicology and includes basic research studies as well as concepts and research activities on environmental problems of a toxicological nature. The nutrition and cancer seminar program includes presentations by off-campus speakers addressing either fundamental concepts of chemical carcinogenesis and the role of dietary and nutritional modification of the carcinogenesis process.

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 Assoc. Prof.
Devine, Marjorie M., Ph.D., Cornell U. Prof.
Dills, William L., Jr., Ph.D., U. of Vermont. Asst. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
Gillespie, Ardyth, Ph.D., Iowa State U. Asst. Prof.
Haas, Jerre D., Ph.D., Pennsylvania State U. Assoc. Prof.
Habicht, Jean-Pierre, Ph.D., Massachusetts Inst. of Technology. James Jamison, Professor of Nutritional Epidemiology
Immink, Maarten D. C., Ph.D., U. of Hawaii. Asst. Prof.
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. Prof.
Levitsky, David A., Ph.D., Rutgers U. Assoc. Prof.
Lewis, Bertha A., Ph.D., U. of Minnesota. Assoc. Prof.
Mondy, Nell I., Ph.D., Cornell U. Assoc. 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.
Roe, Daphne A., M.D., U. of London. Prof.
Sanjurjo, Diva M., Ph.D., Cornell U. Prof.
Schwartz, Ruth A., Ph.D., U. of London. 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. Asst. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
 Wright, Lemuel D., Ph.D., Oregon State Coll. Prof. Emeritus
 Zilversmit, Donald B., Ph.D., U. of California. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology

Joint Appointees

Apgar, B. Jean, Visiting Asst. Prof., U.S. Plant, Soil and Nutrition Laboratory/Nutritional Sciences
 Austic, Richard E., Assoc. Prof., Poultry Science/Nutritional Sciences
 Bauman, Dale, Assoc. Prof., Animal Science/Nutritional Sciences
 Combs, Gerald F., Jr., Asst. 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., Res. Chemist, U.S. Plant, Soil and Nutrition Laboratory/Nutritional Sciences
 VanSoest, Peter J., Prof., Animal Science/Nutritional Sciences
 Warner, Richard G., Prof., Animal Science/Nutritional Sciences
 Wasserman, Robert H., Prof., New York State College of Veterinary Medicine/Nutritional Sciences
 Young, Robert J., Prof., Animal Science/Nutritional Sciences

Officer Education

Captain Donald J. Meyer, U.S.N., Officer Education Coordinator

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 emphasizes the development of leadership and managerial skills and, in addition, includes an appropriate level of drill and ceremony. Throughout the years, Cornell's program of officer education has produced many outstanding military and civilian leaders who were well equipped for success by the knowledge and skills gained from their involvement in ROTC.

The programs of officer education allow the student to prepare for a commission as an officer in either regular military services or the reserves of the United States. The Army, Navy, Marines, and Air Force offer such opportunities, and 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 Gerald J. Hone, Air Defense Artillery, United States Army, Professor of Military Science and Commanding Officer, U.S. Army ROTC Detachment

Major Richard L. Slinkard, Adjutant General Corps, United States Army

Captain John V. Cecalupo, Infantry, United States Army

Captain Gary S. Terhune, Chemical Corps, United States Army

United States Army ROTC Program

The primary objective of the Army Officer Education Program at Cornell is to develop and commission men and women who have the qualifications and potential for service as officers in the reserve and active components of the United States Army. Intermediate objectives are to provide students with an understanding of the fundamentals of responsibility, integrity, and self-discipline, as well as an appreciation of the citizen's role in national defense. The application of the decision-making process to a variety of situations is given major emphasis as a valuable aid in developing leadership potential.

These objectives are achieved through a program normally covering four years. However, a two-year program is available and is discussed in a later section. The program includes specific courses in military science, more general academic subjects that assure a well-rounded education, practical training in leadership through participation in the Cadet Corps (including attendance at a six-week summer camp at an Army installation), and the opportunity to participate in a number of extracurricular activities such as those described below. The combination prepares the student for commissioning and effective performance in most of the many branches of the Army. The student's academic major, academic performance, leadership ability, personal desires, and the needs of the Army determine the branch of the Army in which he or she is commissioned upon graduation.

Requirements for Enrolling

Applicants must be citizens of the United States. (Non-citizens may enroll and will receive certificates acknowledging completion of the course, but do not receive commissions.)

An applicant's vision must be correctable to a minimum of 20/20 in one eye and 20/400 in the other eye. Height must be at least sixty inches for men, fifty-eight inches for women, and no more than eighty inches for men and seventy-two inches for women, although exceptions will be considered. The weight requirement varies according to height and sex. Overall sound mental and physical condition is essential and students are required to undergo periodic physical examinations. Enrollment in the program is subject to the approval of the professor of military science.

Enrollment in specific courses by students not formally enrolled in the program must be approved by course instructors.

Four-Year Program

The Four-Year Program is open to students in their freshman year, or with the approval of military and University authorities, to sophomores in a five-year degree program. Veterans of the Armed Forces of the United States and students entering Cornell with AROTC credit from secondary or military schools (Junior Division AROTC) may receive advanced standing.

Under the Four-Year Program, students pursue the Basic Phase (Mil S I and II) during the first two years and during the next two years the Advanced Phase (Mil S III and IV). A total of twelve credits of military subjects is required. In addition, a number of non-officer education academic enrichment subjects are recommended. These enrichment courses are in such fields as communication arts, psychology, sociology, political science, mathematics, and philosophy. Specific requirements are determined by the student and his or her adviser after initial enrollment. Throughout the 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 semester for which they receive academic credit. This course includes 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 which include rappelling, orienteering, and rifle marksmanship. They are designed to promote personal development and enrichment. While these activities do not receive academic credit, students can elect to receive physical education credit. In the spring semester the student takes a leadership module other than the one taken in the fall and can elect to receive physical education credit. Typical freshman participation in Army Officer Education is 48½ program-related hours.

During the fall of the second year, the student takes a one-credit class in map reading and a one-credit class in military history. In the spring, the student takes a one-credit course in leadership and management and spends approximately two hours a week in practical leadership training as preparation for the Advanced Phase.

Students in the Basic Phase are also required to take six credits of University academic course work in communication arts. Frequently, these courses can be taken as electives to meet other University or degree requirements. With proper planning, the enrichment requirement usually does not entail work beyond normal degree requirements.

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 area 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. Concurrent 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. A student must also complete six credits of University advanced-level enrichment courses. As with the Basic Phase requirement, these hours may generally be applied toward the student's degree requirement hours. The 1½ 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 or an intensive three-week, on-campus summer officer education program. (See Mil S 299 in the *Summer Session Announcement*.)

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 pass specified physical requirements and execute the same written contract as those students who enter the Advanced Phase after completing the regular Basic Phase.

Scholarships

Scholarships are awarded on the basis of merit and are available for one, two, three, or four years. AROTC scholarships are awarded each year to outstanding Basic Camp participants and students in the freshman, sophomore, and junior classes. Cadets who are awarded scholarships continue to receive support until graduation as long as they fulfill the requirements. The active duty requirement for all scholarship students is four years.

Scholarship cadets receive funding for University tuition, required fees, required textbooks, and classroom materials for the duration of their scholarship. Basic course scholarship cadets also receive \$100 a month for up to ten months a year.

Commissioning

All students who successfully complete the Advanced Phase, including the advanced summer camp, are commissioned as second lieutenants in the United States Army Reserve or the Regular Army upon graduation.

Distinguished Military Graduates

Selected senior cadets with high academic achievement and outstanding military qualities are designated Distinguished Military Graduates (DMG). All cadets, scholarship and nonscholarship, are eligible to compete. DMGs may be commissioned in the Regular Army rather than the Army Reserve; those who are so commissioned enter the Army on the same basis as graduates of the United States Military Academy at West Point.

Service Obligations

A variety of active duty and reserve combinations are available. Nonscholarship cadets must spend either three years on active duty and three more years on Reserve status, or three to six months on active duty followed by membership in Reserve units for six years. The manpower requirements of the Army determine the proportion of officers who serve in each category. Current trends indicate that requests for active duty for three years by nonscholarship, non-regular Army officers will be approved. However, it is a competitive process. Similarly, requests for limited active duty (three to six months for training only) are selectively approved. An officer beginning three years active duty first attends the Basic Officer Course (normally eight to twelve weeks) of the assigned branch. Upon completion of this course, the officer is assigned to a unit and location that is determined by the desires of the individual and requirements of the Army. Those officers selected for three to six months attend the Basic Officer Course, after which they are released to Reserve status.

Nonscholarship cadets accepting a Regular Army commission serve a minimum of three years on active duty followed by three years in Reserve status.

Every scholarship cadet (whether commissioned in the Regular Army or the Reserve) serves four years on active duty and two years on Reserve status.

Choice of Branch

Cadets in the second year of the Advanced Phase (normally the senior year) may specify the branch of the Army—such as Infantry, Corps of Engineers, Armor, Signal Corps, Artillery, Air Defense, Ordnance, Chemical, Adjutant General, Judge Advocate General, Finance, Medical Service, Military Intelligence, Military Police—in which they prefer to serve. They are notified in the spring, before commissioning, of the branch to which they are assigned. The likelihood of appointment in a chosen branch depends upon the student's academic and officer education performance, degree area, and the needs of the Army at that time.

Graduate Study

Active duty deferments may be granted to individuals who want to attend graduate school at their own expense after commissioning. Current policy is to approve all requests for active duty deferment for graduate school for two years (three years for law school). Requests for longer deferments will be considered on an individual basis.

Benefits

Each cadet in the Advanced Phase (Mil S III and Mil S IV) receives \$100 a month for ten months a year. While attending the advanced summer camp (between the junior and senior years), each cadet receives approximately \$550 and an allowance for travel to and from camp. Uniforms, textbooks, and supplies required for AROTC instruction are provided by the Army.

A cadet in the Two-Year Program receives the same payments as cadets in the Advanced Phase and in addition, receives approximately \$450 and a travel allowance for basic summer camp attendance before entering the Advanced Phase.

Military Science Courses

All cadets take one course or a module or both each semester in military science. The number of hours a week spent in the classroom varies from semester to semester, as does the credit received for each course. Students in the Four-Year Program are required to take courses as noted below. Students in the Two-Year Program are required to take all of the courses listed for the junior and senior years.

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 481 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 allows 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 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 first-hand 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 rifle marksmanship, orienteering, or rappelling. These interesting and

challenging activities do not provide academic credit, but may be used for physical education credit if adequate hours have been accrued.

Mil S II Leadership Laboratory II

Fall Spring
Not offered Mil S 242

Cadets meet for two hours each week as members of the cadet organization to participate in practical leadership exercises. Types of practical activities include familiarization in rifle marksmanship, orienteering, drill and ceremonies, signal communications, physical fitness training, 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. Cadets 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

Donald J. Meyer, United States Navy, Professor of Naval Science and Commanding Officer, Naval ROTC Unit

Commander Joseph M. Quigley, United States Navy
Major Robert A. Packard, United States Marine Corps
Lieutenant Curtis J. Hawks, United States Navy
Lieutenant Charles P. Schuster, United States Navy
Lieutenant David M. Armitage, United States Navy
Lieutenant Barton S. Finegan, 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, which 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. They are 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 6,000 scholarships in over fifty-five universities nationwide to selected students who want to serve in the Navy or Marine Corps. Financial support is provided students during college preceding the award of the baccalaureate degree.

Benefits

The program provides uniforms, full tuition, most instructional fees, textbooks, nonconsumable supplies, and \$100 a month for a maximum of forty months. Successful completion of the Scholarship Program leads to a commission in the Regular Navy or Marine Corps. At Cornell University over 90 percent of Naval students have a scholarship. In the past, of those students who have entered the Cornell program without a scholarship, more than 80 percent have been successful in obtaining one.

Entering the Scholarship Program

There are three ways to enter the Scholarship Program:

First, by applying for the national competition each year. This entails filling out and sending an appropriate application, being interviewed, having a physical examination, and applying to and being accepted by one of the NROTC colleges or universities throughout the country.

Second, by enrolling in the College Program at Cornell and being recommended by the Professor of Naval Science for a scholarship after at least one year in the program.

Third, by entering through one of the Two-Year College Programs.

College Programs

There are two College Programs available. Both lead to a commission in the Naval or Marine Corps Reserve and three years of active duty.

Each of these programs provide textbooks for naval professional courses, uniforms, and a subsistence allowance of \$100 a month from the beginning of the junior year.

The regular College Program is three to four years long. Academic requirements for students in this program are somewhat less than those for scholarship students as noted in the curriculum section of this booklet.

The Two-Year College Program begins the summer before the junior year, when students attend a required program at the Naval Science Institute in Newport, Rhode Island, with pay.

Summer Training

Each summer, students in the Scholarship Program spend approximately six weeks on a Navy ship or with a naval activity anywhere in the world for on-the-job training. College Program students attend at least one summer training session of the same duration between the junior and senior years. While attending summer training sessions, midshipmen are paid approximately \$400 a month.

Active Duty Requirements

As required by Section 2107, Title 10, United States Code, selected applicants must enlist in the United States Naval Reserve for six years in pay grade E-1 (seamen recruit) prior to being appointed midshipman, USNR, and receiving compensation. Students that are disenrolled from the NROTC Navy-Marine Corps Scholarship Program for reasons beyond their control shall, upon disenrollment, be discharged from their enlisted status. It should be understood that two years active enlisted service will be required of those students who default from the terms of their NROTC contract after the beginning of their junior 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, large and small surface ships, engineering duty officer billets, civil engineering corps, and supply corps.

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 sessions are held from 2:30 until 4:00 on either Wednesday or Thursday afternoon. These periods are planned and implemented for the most part by the midshipmen officers in the battalion organization and consist of both drill and professional information briefings and underway training aboard the unit's fifty-foot seagoing sail training ketch. 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. Noncredit.

One-hour class each week (lecture-recitation). Navy staff.

A study of fundamental aspects of naval science, including its conceptual contributions to sea power, factors involved in the physical development of naval forces, resources which must be managed, and prospects for the future.

Nav S 102 (also M&AE 101) Naval Ship Systems Spring. 3 credits.

3 lecture-recitation classes each week. R. L. Wehe. An introduction to primary ship systems and their interrelationship. Basic principles of thermodynamics, propulsion, mechanical operation, internal communications, electronics, ship structure, and other marine systems are considered.

Sophomore Year

Nav S 201 Naval Weapons Systems Fall. 3 credits. Prerequisites: Mathematics 192 or 112 and Physics 208 or 214.

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 development of an algorithmic solution method applicable to the digital computer.

Nav S 202 Seapower—Maritime Affairs Spring. 2 credits.

One seminar weekly. Navy staff. Discussions explore the meaning and modern applicability of seapower concepts, including such components as naval power, ocean science, ocean industry, ocean commerce, and international law.

Junior Year (Navy)

Nav S 305 (also Ag En 305) Principles of Navigation Fall. 4 credits.

4 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.

Nav S 321 Naval Operations Spring. Noncredit.

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 also are discussed.

Senior Year (Navy)

Nav S 431 (also H Adm 414) Organizational Behavior and Small Group Problems Fall and Spring. 3 credits.

Current research is examined to provide a conceptual framework for understanding group processes within organizations. In addition, students participate in experiential labs 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. Noncredit.

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 counseling his subordinates in the role of the division officer. Through the use of lectures, situation problems, and role playing, the student will learn about the various aspects of naval 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. Presentation 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.

3 lecture-recitations each week. Marine Corps staff. The history of the development, theory, techniques, and conduct of amphibious operations during the twentieth century. Special emphasis will be on amphibious operations conducted in the Central Pacific during World War II.

Other Required Courses

Navy Option

In order to receive commissions in the United States Navy, midshipmen must complete all the requirements for a baccalaureate degree as well as certain academic requirements specified by the Navy. Study in engineering and scientific fields is required for a majority of Navy-option scholarship students. Specifically, 80 percent of the Navy-option scholarship students are encouraged to pursue majors in engineering and approved sciences (chemistry, mathematics, physics, computer science, oceanography, operations analysis, or the physical sciences) to meet the technological requirements of the modern Navy. Other fields of study for majors leading to a baccalaureate degree and having a direct applicability for the unrestricted line are permitted with the approval of the Professor of Naval Science. Academic majors in fields that show a career interest apparently antithetical to a career in the unrestricted line (for example, agronomy, art, floriculture, music, physical education, predoctoral studies, theology, or wildlife management) are precluded for Navy-option scholarship students. Because of changing terminology for academic fields of study, it is not practical to provide a complete list of authorized and unauthorized majors. Examples of fields of academic study of interest to the Navy for educating officers of the unrestricted line are:

Asian studies	management
chemistry	mathematics
computer science	oceanography
economics	operations analysis
engineering	physical sciences
European studies	physics
foreign affairs	public administration
history	Soviet studies
Latin American studies	

Although there are few restrictions placed upon Navy-option College Program students (or any Marine-option students) with respect to academic majors, it is important to understand the vital need for mathematics and science in the modern Navy. College Program students who want to compete for a scholarship are encouraged to select majors in those fields listed above.

Other required courses depend on the commissioning program in which the Navy-option midshipmen are enrolled and are given in the following sections.

Scholarship Program Navy-Option Students

All Navy-option scholarship students must complete two semesters of science-level calculus (six credits minimum) by the end of the sophomore year and two semesters of calculus-based physics (six credits minimum) by the end of the junior year.

Scholarship Program Navy-option students who do not major in chemistry, engineering, mathematics, physics, computer science, oceanography, operations analysis, or the physical sciences must also complete two science or engineering courses as electives.

College Program Navy-Option Students

College Program students who desire entry into the Navy-Option Scholarship Program should fulfill all of the requirements applicable to Navy-option scholarship students to be eligible and competitive for a Professor of Naval Science (PNS) Scholarship.

Marine Option

Any Naval 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 elective or social sciences and humanities requirements. Consult your 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
DBS 105 Introduction to Computer Programming
Com S 101 The Computer Age
Com S 102 Introduction to FORTRAN Programming
Com S 211 Computers and Programming
Com S 314 Introduction to Computer Systems and Organization
M&AE 389 Computer-Aided Design
Com S 436 Introduction to Computers in Planning
H Adm 114 Information Systems I
Ag En 151 Introduction to Agricultural Engineering and Computing
Ag En 152 Engineering Drawing
I&LR 211 Economic and Social Statistics

Extracurricular Activities

The Navy ROTC student at Cornell is offered a broad range of activities in which to participate. Each summer, as an optional part of their summer training, midshipmen sail aboard the Unit Sail Training Vessel *China Doll* to distant ports of call. Back at Lake Cayuga a highly respected sail training program offers instruction, both in small sailboats and in large boat sailing, onboard *China Doll*, to all who want to participate. The unit offers a comprehensive sports program in which most midshipmen participate. The Navy unit has won the independent Division All Sports Trophy for four of the last five years. Midshipmen participate in a myriad of social events, including the annual Navy ball, the Tri-Service military ball, and traditional Naval mess nights.

Major Gary R. Fisher, United States Air Force
Captain Joseph Pallay, United States Air Force
Lieutenant Paul A. Gifford, United States Air Force

The objective of the Air Force Office Education program at Cornell is to prepare men and women for positions as officers in the United States Air Force. The program is designed to provide the student with a background of aerospace knowledge and to further develop qualities of leadership, integrity, and self-discipline. The objectives are achieved through four-year and two-year programs. These programs include specific courses in aerospace studies and practical laboratories.

Entering students are assigned to one of four categories: flying (pilot-navigator), missile, engineering-science, and general service. These assignments are based on the student's preferences, qualifications, academic field of study, and the needs of the Air Force.

Requirements for Enrollment

The Air Force Officer Education program is open to any undergraduate or graduate student enrolled in any major field of study. The student's academic course of study is often a prime factor in determining the kind of career pursued in the Air Force. (See Air Force Careers below.)

Applicants must be United States citizens. Noncitizens may enroll and will receive certificates acknowledging completion of the course, but cannot receive a commission.

Applicants who are interested in flying (as pilot or navigator) or missile duty should make that request known at the time they enter the program.

All applicants receive physical examinations at no cost and, to be accepted, must meet the physical requirements listed below.

Though the program is designed to prepare future Air Force officers, Department of Aerospace Studies courses are open to all students at Cornell.

Physical Requirements

Every applicant must be free from any limiting physical infirmity and must have normal hearing, blood pressure, and heartbeat. Weight must be normal for height and age.

Following are the additional specific requirements for nonflying categories.

Vision: bilateral distant vision without corrective lenses, at least 20/400.

Height (for men): at least sixty but not more than eighty inches; (for women): at least fifty-eight but not more than seventy-two inches.

Allergy: no history of asthma since twelfth birthday.

Dental health: good.

Those students who are interested in qualifying for flying categories (pilot or navigator) must meet the following specific requirements:

Vision (for pilot candidates): 20/20 bilateral near and far vision without corrective lenses; (for navigator candidates): bilateral near vision at least 20/20 without corrective lenses and bilateral far vision at least 20/70 without correction, providing it is correctable to 20/20 with lenses.

Color vision: normal.

Height: at least sixty-four but not more than seventy-six inches; sitting height not more than thirty-nine inches.

Allergy: no history of allergy or hay fever since twelfth birthday.

Dental health: good.

Four-Year Program

The four-year program is open to all freshman students. Sophomores may enter the program, but require departmental approval. Students in a five-year degree program may enroll in their freshman or sophomore year.

Veterans of the United States armed forces and students entering Cornell from military schools may receive advanced standing, subject to approval by the Professor of Aerospace Studies.

The four-year program consists of the basic program (first two years) and the Professional Officer Course (advanced program) during the junior and senior years. The basic program carries no military commitment and students may withdraw at any time during that period.

Basic Program

Students in the basic program take one credit of classroom work offered by the Department of Aerospace Studies each semester. During the freshman year, the role of the United States military forces in the contemporary world is examined with emphasis on human rights and the organization and mission of the United States Air Force. The functions of strategic offensive and defensive forces, general purpose forces, and aerospace support forces are covered. In the sophomore year, the history and development of military aviation and American air power are studied.

Students also spend one hour a week in a leadership laboratory, which includes classroom instruction in responsibilities and the environment of the junior officer and instruction and practice in basic drill and ceremonies. In addition, all students participate in summer field training for four weeks between their sophomore and junior years.

Professional Officer Course

The Professional Officer Course (POC) is a two-year advanced course of instruction. Students who are accepted for the POC must have successfully completed or validated the basic course and must meet the academic and physical standards. Each cadet accepted into the POC must sign an agreement to complete the program and accept, if tendered, a commission in the Air Force Reserve upon graduation.

Classroom study in the POC requires three hours a week each semester. In the junior year, cadets study Air Force leadership and management at the junior officer level. During the senior year, cadets study the elements of national security and the place of the military in American society. Leadership laboratory requires a minimum of one hour a week in the junior and senior years. In the leadership laboratory the cadet is exposed to advanced leadership experiences and applies principles of management learned in the classroom.

Flight Instruction Program

All cadets accepted for pilot training participate, in their senior year, in the Air Force ROTC flight instruction program at no cost.

This program consists of ground school and twenty-five hours of flying training in a light aircraft. Instruction is provided by a local civilian flying school. Upon completion of the program, a cadet may continue training for a private pilot's license through the Federal Aviation Agency.

Two-Year Program

The two-year program consists of the last two years (the Professional Officer Course) of the regular four-year program plus a six-week summer training course preceding enrollment. (Details of the Professional Officer Course are given above.)

The two-year program is open to male and female students with two years of academic study remaining at Cornell (graduate or undergraduate), or at schools under crosstown or consortium agreement. Applications are accepted from November through May of the year preceding the applicant's planned entry into the program. Selectees are then required to successfully complete a six-week summer training program at government expense.

Department of Aerospace Studies

Lieutenant Colonel Ronald F. Kozma, United States Air Force, Professor of Aerospace Studies and Commander, Air Force ROTC Detachment 520

Scholarships

The Air Force awards more than six thousand scholarships annually. Four-year AFROTC scholarships are awarded to selected high school seniors. Three- and two-year scholarships are awarded annually on a competitive basis to students enrolled in the Air Force Officer Education Program. Applicants for the two-year program are also eligible to be considered for scholarships. Financial status or the award of other scholarships does not disqualify applicants for AFROTC scholarship awards. Acceptance of an AFROTC scholarship does not commit an individual to serve any additional time on active duty with the Air Force.

The vast majority of two-, three-, and four-year scholarships are limited to students majoring in engineering, physics, mathematics, computer science, and atmospheric science. A limited number of four-year scholarships are available to those enrolled in nontechnical academic majors such as business administration, accounting, and foreign languages. Some two- and three-year scholarships are awarded to students in nontechnical academic majors who desire to become navigators or missile launch officers.

A scholarship cadet receives a \$100 a month tax-free subsistence allowance, all tuition, fees, and reimbursement for the cost of textbooks for the duration of the scholarship.

Fees

A uniform deposit of \$30 is required. Students are also encouraged to contribute to a Cadet Activities Fund to cover the cost of most of their social activities.

Benefits

All cadets in the advanced program (POC) receive \$100 a month nontaxable subsistence allowance for the academic year. During the four- or six-week summer field training (see below), each cadet receives pay equal to one-half of a second lieutenant's salary, plus an allowance for travel to and from the field site. Most textbooks and supplies required for Department of Aerospace Studies courses are provided.

All cadets are eligible to participate in field trips made to Air Force bases throughout the country. Scholarship and advanced cadets (POC) are entitled to space-available rides on all aircraft flying within the continental United States.

Field Training

There are two types of field training: a four-week course for cadets in the Four-Year Program and a six-week course for Two-Year Program applicants. Students of either program normally attend field training between their sophomore and junior years. Field training is hosted each summer by several active Air Force installations.

Field training is designed to stimulate the development of military leadership among students through meaningful experiences. This is accomplished through the field training curriculum and associated activities. The curriculum consists of aircraft, aircrew, and survival orientation, junior officer training, physical training, small arms training, a social-action program, and supplemental training. Special emphasis is placed on career orientation and interaction with young officers in fields of interest to the student. The six-week field training program differs in that it has an additional sixty hours of academic course work similar to the sixty hours of course work taken by the Four-Year Program cadets during their freshman and sophomore years.

In addition to field training, Airborne Training (parachute jumping instruction) is available as an extracurricular activity to selected volunteer cadets.

Advanced Training Program (ATP)

This program allows selected cadets to go to active duty Air Force bases for a two- or three-week period during the summer following their junior year. As "third lieutenants," cadets receive specialized career orientation and an opportunity to experience leadership, human relations, and management challenges encountered by Air Force junior officers. Cadets also have an opportunity to become familiar with the Air Force way of life. Cadets receive pay and allowances authorized by current directives at the time of Advanced Training attendance.

Commissioning

All students who successfully complete the 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

Aero S 161 United States Military Forces Fall.

1 credit.

1 class each week. J. Pallay.

A study of current United States military forces with emphasis on the analysis of the doctrine, mission, and organization of the United States Air Force. Current factors affecting today's professional military

officers are considered. Special emphasis is placed on the role of human rights in the Department of Defense. The elements of strategic offensive and defensive forces is explored.

Aero S 162 Aerospace Operations Spring. 1 credit.

1 class each week, plus a field trip to a local military installation. J. Pallay.

The aerospace forces of the United States are studied, with emphasis on the mission, resources, and operations of tactical air forces throughout the world. Army and Navy operations and functions as contributions to the total national defense are reviewed. Through the case-study method, aerospace budgetary decision making is introduced.

Sophomore Year

Aero S 211 Development of Military Aviation Fall. 1 credit.

1 class each week. R. F. Kozma.

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.

Aero S 212 American Air Power Since 1947 Spring. 1 credit.

1 class each week. R. F. Kozma.

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

Aero S 331 Leadership and Communicative Skills Fall. 3 credits.

2 or 3 classes each week. G. R. Fisher. Leadership responsibilities at the junior officer level including the responsibility, authority, and functions of a military commander and his staff emphasize management research and theory. Recent approaches to leadership models and the importance of communication skills in any leadership role are considered. Case study exercises and oral and written assignments are required.

Aero S 332 Management in the Armed Forces Spring. 3 credits.

2 or 3 classes each week. G. R. Fisher. Management at the junior officer level. Basic concepts of management and decision-making process, including planning, organizing, coordinating, directing, and controlling. Evaluation process and techniques used by management are studied. Position of management in world of power and politics, including managerial strategy and tactics is considered. Case studies and oral and written assignments are required.

Senior Year

Aero S 461 Military and American Society Fall. 3 credits.

2 or 3 classes each week. P. A. Gifford. The functions and roles of the professional officer in a democratic society and how they relate to the socialization processes, prevailing public attitudes, and value orientations associated with professional military service are examined. Changes within the military are analyzed, including such topics as the

all-volunteer service, race relations, and the impact of women in the armed forces. The essential features of the military justice system as it functions to protect basic human rights and organizational order are reviewed. The formation and implementation of defense policy including political, economic, and social constraints is studied.

Aero S 462 American Defense Policy Spring.
3 credits.

2 or 3 classes each week. P. A. Gifford.
The prerequisites for maintaining adequate national security forces are explored, and the impact of technological and international development upon strategic preparedness and the overall defense policy-making process is assessed. An investigation of basic contemporary nuclear strategy, its evolution, control, and future. Alternatives to nuclear war including arms control, limited wars, wars of revolution, and insurgency are examined. Governmental processes and relationships that determine the contemporary military environment and provide a perspective for the future of defense policymaking in the United States.

Elective Course

Aero S 405 Principles of Air Navigation and Aircraft Systems Fall. 3 credits. Not offered 1981-82.

2 classes each week.
Basic principles of weather elements, aerodynamics, aircraft systems, engine systems, and navigation systems. The study of these systems is integrated with chart projections, navigational aids, flight instruments, and avionics. Use of flight computer will be covered. This will prepare students for F.A.A. Private Pilot Ground School Test.

Leadership Laboratory Courses

All Air Force cadets spend at least one hour a week throughout the academic year in a leadership laboratory, for which no academic credit is given. Occasionally laboratories are held at times other than the normally scheduled period (such as the fall Veteran's Day Parade and the spring Military Awards Ceremony). All cadets also are expected to either observe or participate in an evening dining-in. Cadets are required to pass minimum physical fitness and weight standards once a semester.

Aero 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.

Aero S 241-242 Intermediate Military Experiences

Develops skills in giving commands for drill and ceremonies. Introduction to Air Force base environment in which the USAF 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.

Aero 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.

Aero 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.

Aero 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.

Faculty Roster

Hone, Gerald J., Lieutenant Colonel, M.A., U. of Alabama. Prof., Military Science
Kozma, Ronald F., Lieutenant Colonel, M.A., U. of Northern Colorado. Prof., Aerospace Studies
Meyer, Donald J., Captain, M.S., George Washington U. Prof., Naval Science

Department of Physical Education and Athletics

Administration

Alan E. Gantert, associate director of athletics and director of physical education and intramurals
John R. West, assistant director of physical education
Lucille R. Cointe, senior administrative secretary

Cornell is proud of its diversified physical education program—unique in its concept and tradition of excellence—that encompasses over forty recreational activities, ranging from the aquatic depths of scuba diving to the heights of mountain climbing. It ranks among the five largest university programs in the nation.

Teaching emphasis in the program is placed on recreational activities that can be continued outside the University. Each member of the instructional staff has extensive experience and skill in the area he or she teaches, and all of the abundant facilities available to the athletic department are used as needed in the program.

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 located 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, scuba diving, swimming and water safety, volleyball, basketball, and weight lifting are held here. When academic classes are in session, Teagle is open from 9:00 a.m. to 10:00 p.m. Monday through Friday, 9:00 a.m. to 5:30 p.m. on Saturday, and 11:00 a.m. to 6:30 p.m. on Sunday. During the summer the building is open Monday through Friday only, 8:30 a.m. to 7:00 p.m.

Helen Newman Hall, located 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, cycling, dance, fencing, gymnastics, lacrosse, physical conditioning, riflery, scuba diving, softball, swimming, tennis, volleyball, and yoga 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 noon to 5:00 p.m. on Sunday. During the summer it is open Monday through Friday only, 8:30 a.m. to 5:00 p.m.

Barton Hall, located on Garden Avenue opposite Teagle Hall, contains a large open gym floor. Classes in badminton, volleyball, first aid, jogging, weight control, physical fitness, and hunter safety are held here.

Lynah Rink is used for classes in ice skating, figure skating, and hockey, 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 squash and racquetball 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 riding and polo instruction; Moakley golf course for recreational golf; the Kite Hill indoor tennis bubble; Tompkins County Rod and Gun Club for trapshooting and skeet; and Greek Peak, Virgil, New York, for skiing.

Schedules for all athletic and building use 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 assigns 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.

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 lifeguard at all times. Swimming is allowed only when a lifeguard is on duty.

Physical Education Requirements

All undergraduate students admitted to Cornell as freshmen in 1978 or thereafter must complete two terms of physical education—normally during the first two terms of attendance. Undergraduates who enter as freshmen before 1978 must complete four terms.

In addition, the University Faculty Committee on Physical Education has established a basic swimming qualification requirement for all entering freshman students. The test consists of a continuous seventy-five-yard swim using front, back, and optional strokes. Freshmen take the test as part of their physical education registration process. Normally women take the test in the Helen Newman pool, and men in the Teagle pool. 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.

Circumstances permitting exemption from, or postponement of, these requirements are outlined in the section on waiver of requirements. The department will accept current Red Cross senior lifesaving certificates in lieu of the test.

Transfer Students

Students who transfer to Cornell from another college or university will be given credit for one term of physical education for every term of academic transfer credit they are granted by Cornell. Effective September 1979, any transfer student entering Cornell as a sophomore or higher is not required to take physical education classes for credit. Transfer students subject to the credit requirement must take the swim test before signing up for an elective.

Waiver of Requirements

A waiver of 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);
- 2) is twenty-two years of age or older at the time of admission to Cornell;

- 3) is committed to twenty hours or more of employment per week (the director of scholarships and financial aid must issue the request for exemption, certifying the necessity for such employment obligations); or
- 4) has been in military service.

Permission for postponement of, or exemption from, the physical education requirements is issued only by the University Faculty Committee on Physical Education, through the representative in the student's college office. Final authority for interpreting and ruling on requests for exemption rests with this committee.

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) participation in an athletic club or organization recognized by the director of physical education as fulfilling the purpose of the physical education requirement (application for club recognition must be submitted to the director by September 30 each year).

Students receive credit for one course only per term. If a student enrolls in more than one course per term, credit is 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 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. 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.

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 are filled on a first-come—first-served basis.

Physical education courses taken for credit may be dropped or added only 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. A \$25 penalty fee is charged by the University for late enrollment (occurring after the drop-add period). In addition, the physical education department assesses a \$10 penalty fee for a course change made after the drop-add period; only one such change is allowed a student each term.

Course Fees

Information about fees associated with physical education courses is usually available at the time of course registration (some fees cannot be set until the course meets). Course fees are not charged to the account of a student enrolled in the University until two weeks after course registration. All fees thus charged are billed through the bursar's office. Other participants in courses involving fees usually must pay when they register. Only the person paying the fee will be allowed to use the playing time allotted by the fee. Payment will be waived or refund made only if:

- 1) the participant withdraws from the course during the designated add-drop period (the withdrawal must be made at the physical education office in Teagle Hall);
- 2) the instructor withdraws the participant's name from the class roll;
- 3) the participant fails to pass preliminary course requirements; or
- 4) 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).

Courses Offered

The courses and fees described in this handbook 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.

190 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.

131 Athletic Training and Injury Fall and spring.

Two-hour class one evening a week, Teagle Hall.
Survey of anatomical, physiological, and psychological causes and results of athletic injuries.

220 Basketball Fall and spring.

Two classes a week, Teagle Hall.
Fundamental drills in passing, shooting, and dribbling. Scrimmages each class session.

150 Bowling Fall and spring. Fee charged.

Two classes a week, Helen Newman Hall.

156 Equestrian Fall and spring. Fee charged.

One class a week, Oxley Polo Arena. Class days and hours are arranged at registration according to riding ability and experience.

171 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.

130 Basic First Aid Fall and spring. Fee charged.

One or two classes a week, Teagle Hall.
American Red Cross standard first aid course.
Certification is awarded upon satisfactory completion of the course.

108 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.

154 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.

173 Jogging Fall and spring.

Two classes a week, Teagle Hall.
A program to meet the needs of each individual. Progress from jogging a few hundred yards to a capacity of three miles at the end of twelve weeks.

161 Karate Shito Ryu Fall and spring. Fee charged.

Two evening classes a week, Teagle Hall.
A beginning course taught by professional staff.

227 Basic Lacrosse Fall.

Two classes a week, Helen Newman Hall.
Instruction and practice in basic skills (cradling, passing, catching, goal shooting, checking) and team play.

331 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.

186 Racquetball Fall and spring. Fee charged.

Two classes a week, Teagle Hall.
Instruction at all levels. Equipment is furnished.

225 Recreational 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.

157 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.

320 Soccer Fall.

Two classes a week, Teagle Hall.
Introduction to the game. Includes basic individual skills (passing, trapping, volleying) and team play and strategy.

187 Squash Fall and spring. Fee charged.

Two classes a week, Teagle Hall.
Classes for all levels of play. Equipment is furnished.

160 Tai Chi Chuan Fall and spring. Fee charged.

Two classes a week, Teagle Hall.
Tai Chi is a system of graceful, slow-movement exercises that aim at nurturing relaxation, deep breathing, and improved circulation.

330 Weight Lifting 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 novice groups.

174 Yoga 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.

Aquatic Courses

110 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.

111 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.

112 Advanced Swimming

Fall and spring.
Two classes a week, Helen Newman Hall.
Practice and perfection of the eleven basic strokes.

113 Diving

Fall.
Two classes a week, Helen Newman Hall.
Instruction in all the basic dives, including front (pike and layout), back, front and back somersault.

114 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 upon satisfactory completion of the course.

115 American Red Cross Water Safety

Instructor 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 upon satisfactory completion of course.

115 Water Safety Instructor Refresher Course

Spring.
Two classes a week, Teagle Hall.
Selected sessions of the basic water safety instructor course.

116 Basic Scuba Diving

Fall and spring. Fee charged.
Two classes a week, Teagle Hall.
Beginning scuba—for general certification only. All equipment is provided for pool sessions, including tanks, regulator, snorkel, and vest.

117 Scuba Diving—National Certification

Fall and spring.
Helen Newman Hall. Hours to be arranged.
Program includes skill training in a pool and open-water training in Cayuga Lake. Internationally recognized basic certification.

118 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.

Badminton

180 Beginning Badminton

Fall and spring.
Two classes a week, Helen Newman Hall and Teagle Hall.
Fundamental shots, scoring, and general play.

188 Intermediate Badminton

Fall and spring.
Two classes a week, Helen Newman Hall and Teagle Hall.
Practice of overhead dives and crosscourt shots, doubles competition.

189 Advanced Badminton

Fall and spring.
Two classes a week, Helen Newman Hall and Teagle Hall.
Emphasizes doubles strategy and singles and doubles competition within the class group.

Dance

121 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.
Instruction in dances such as the waltz, Charleston, rumba, and tango.

122 Square Dancing

Fall and spring. Students and their partners must sign up at course registration.
Two classes a week, Helen Newman Hall.
Introduction to square dancing.

123–138 Dance

Fall and spring.
Two 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.

123 Ballet Fundamentals

124 Modern Dance Fundamentals

131 Elementary Ballet

132 Elementary Modern Dance

133 Elementary Jazz Dance

134 Intermediate Ballet

136 Intermediate Modern Dance

138 High Intermediate Modern Dance

Fencing

152 Beginning Fencing

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.

153 Intermediate Fencing

Fall and spring. Fee charged. Prerequisite: Beginning Fencing.
Two classes a week, Teagle Hall.
Interclass competition is stressed. Equipment is furnished.

Golf

140 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.

141 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.

Outdoor Skills

100 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.

101 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.

102 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.

103 Survival Weekend

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.

104 Ice Climbing

Spring. Limited to students experienced in mountain climbing. Prerequisite: permission of instructor. Fee charged.
Hours to be arranged, Teagle Hall.
Climbing techniques for ice surfaces. Includes outings to local parks.

105 Advanced Mountaineering

Spring and fall. Prerequisite: Basic Mountaineering. Fee charged.
Hours to be arranged, Teagle Hall.
Saturday outings to local parks feature advanced rock-climb skills and rescue techniques.

106 Bicycle Touring and Camping

Fall and spring. 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.

107 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.

107 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.

109 Winter Camping

Spring. Limited to experienced outdoor people. Coed sections. 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.

109 Ski Camping

Spring. Open to any skier. Prerequisite: backpacking experience; no skiing prerequisite. Coed. Fee charged.
Hours to be arranged, Teagle Hall.
Classes and local one-day outings lead to a weekend of ski touring in a New York State forest area.

Riflery

132 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.

191 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.

192 Skeet and Trap Shooting

Fall and spring. Fee charged.
Two-hour class one afternoon a week, Teagle Hall.
Includes lectures and shooting at the Tompkins County Rod and Gun Club range. Guns and shells are furnished.

Skating

200 Basic Skating Fall and spring. Intended 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.

201 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.

202 Intermediate and Advanced Figure Skating

Fall and spring. Enrollment 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.

204 Basic 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

153 Ski Conditioning Fall.

Two classes a week, Helen Newman Hall. Exercises designed to increase flexibility, strength, and endurance in preparation for the ski season.

300 Downhill Skiing Spring. Fee charged.

One class a week, Teagle Hall. Transportation, instruction, ski-lift fees, and ski time are offered in package deal. Greek Peak personnel will be present at registration to explain the program and accept fees. Bus transportation to Greek Peak is provided six afternoons a week for six weeks.

301 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.

Tennis

181 Indoor Tennis Spring. Fee charged.

Two classes a week for the entire term, Teagle Hall. Classes for all levels of play. Emphasizes strategy for intermediate and advanced groups. Space limitation requires doubles play.

182 Beginning Outdoor Tennis Fall. Fee charged.

Three classes a week for half a term, Helen Newman Hall. Instruction and practice in basic strokes (forehand, backhand, serve).

184 Intermediate Outdoor Tennis Fall. Fee charged.

Three classes a week for half a term, Helen Newman Hall. Use of fundamental strokes, lobs, and drop shots; doubles strategy.

185 Advanced Outdoor Tennis Fall. Limited to experienced tennis players. Fee charged.

Three classes a week for half a term, Helen Newman Hall. Emphasizes strategy.

Volleyball

221 Beginning Volleyball Fall and spring.

Two classes a week, Helen Newman Hall and Teagle Hall. Drills, fundamentals, and team play.

222 Intermediate Volleyball Fall and spring.

Two classes a week, Helen Newman Hall and Teagle hall. Passing and blocking strategy; scrimmages in class.

223 Advanced Volleyball Fall and spring.

Two classes a week, Helen Newman Hall and Teagle Hall. Offensive and defensive team strategy is emphasized in class scrimmages.

Division of Summer Session, Extramural Courses, and Related Programs

Administration

Robert D. MacDougall, dean
Joanne E. Davenport, director, Conference Office
Judith K. Eger, assistant to the dean
Vivian S. Geller, director, Continuing Education Center
Charles W. Jermy, Jr., assistant dean, Summer Session and Extramural Courses
G. Michael McHugh, director, Cornell's Adult University

Summer Session

The Cornell University Summer Session provides some unique and unusually attractive opportunities for study and recreation for students who range in age from the high school senior to the senior citizen. With Ithaca weather at its best, summer study makes available the extensive academic and recreational facilities of the University and the Finger Lakes region. Students may choose from a wide spectrum of courses, which are scheduled during three-week, six-week, and eight-week sessions, and dozens of special programs of varied lengths. Admission is kept relatively open and simple. Classes meet daily, and because they are usually small, a close association between student and teacher is made possible.

The summer session instructional staff numbers approximately 325, of whom 50 are visiting faculty; 150 teaching assistants participate also.

For more information consult the Division of Summer Session, B12 Ives Hall, or call 256-4987.

Winter Session

During late December and January, the Extramural Division offers students an opportunity to undertake three to five weeks of concentrated study and earn up to six credits. Programs of study are varied and include self-directed independent study as well as traditional, professor-directed group study. Among the special courses offered in recent years have been study tours to England, the Soviet Union, and Costa Rica.

For more information consult the Division of Extramural Courses, B12 Ives Hall, or call 256-4987.

Extramural Courses

The Division of Extramural Courses makes it possible for area residents to take one or two courses a term in areas of their own interest. Persons may register for practically any course in the University for which they have the necessary prerequisites provided space is available after all degree candidates have been registered, and written permission has been obtained from the instructor. Permission must be obtained in advance of registration on a form provided by the extramural division. Registration is normally limited to 8 credit hours. Tuition is at the rate of \$175 a credit for 1981-82, which does not include fees for services available only to full-time Cornell students. Courses taken through the Division of Extramural Courses carry regular Cornell University credit that may be used for certification for employment and in meeting

requirements for academic degrees. 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 charge of \$17.50 a credit. Visitors are required to obtain written permission of the instructor and may enroll only on a space-available basis. In this program no credit is given and no record is kept of attendance or performance. For further information about both programs contact the extramural office in B12 Ives Hall or call 256-4987.

Conference Office

Excellent facilities, a beautiful campus, and a conference office concerned with each group's special needs make Cornell an ideal setting for conferences and meetings. Professional groups from all over the country come to Cornell to take advantage of this special learning environment. The conference coordinator is available to answer questions, advise on creative program ideas, assist in planning, make special arrangements, secure accommodations, and handle other administrative details. Every effort is made to ensure the success of each conference. For more information about conferences at Cornell consult the Conference Office, 221E North Campus Union, or call 256-6290.

Continuing Education Center

The Continuing Education Center (CEC) at Cornell University provides information, counseling, and special programs for men and women who have been out of school for several years and want to resume their education. Anyone wanting to take courses, pursue a degree, or participate in other continuing education activities is welcome to use the services of the center. Students currently registered at Cornell whose education has been interrupted are also encouraged to use the center's resources.

The CEC is strongly committed to educating people in all walks of life. Central to this commitment is the belief that learning does not end at one's high school or college graduation, or with a successful career. Every effort must be made to pursue both intellectual and personal growth within the context of one's individual situation. The center's aim is to foster this development.

The center sponsors and conducts programs throughout the year on professional development, personal growth, adjusting to the university environment, rekindling academic skills and study habits, and subjects of special interest. CEC also provides information on all schools and colleges of the University, opportunities for part-time and full-time study, special workshops and seminars, and community resources available to continuing education students. A small library includes information on continuing education research, adult learning and development, educational opportunities at local institutions of higher learning, and financial aid and admissions procedures. In addition, the center provides individual and group counseling to mature students. For further information contact the Continuing Education Center, B12 Ives Hall or call 256-4989.

Cornell's Adult University

Cornell's Adult University (CAU) administers one week non-credit academic courses on campus during the summer and off-campus weekend seminars during the fall and spring. While it was originally conceived as a program for alumni, this concept has long since been abandoned in favor of a concept of "adult" education, thus extending course offerings to all interested persons within the intent of

the Morrill Land Grant Act. CAU is committed to the concept that learning never ends and that one of the roles of a great university is to provide a bridge between the traditional, formal education and more informal, noncredit instruction.

Faculty preparation and teaching of CAU courses is of the high quality associated with Cornell. Although CAU does not offer course credit, many secondary school teachers have received in-service credit from their local school boards for participation in CAU programs. Other participants have returned to college to complete their formal educations or attend graduate school. For more information consult Cornell's Adult University, 626B Thurston Avenue, or call 256-6260.

Summer Courses

The Cornell University Summer Session offers a wide variety of courses each year. Among these are a number of courses that are typically offered each summer. Based on past experience, the list that follows includes those courses that are likely to be offered during the summer of 1982. The list is not exhaustive; many additional courses that are offered only occasionally or for the first time are not listed. For further information contact the Summer Session office, B12 Ives Hall. The 1982 *Announcement of Summer Session* will be published in March.

Anthropology

- 111 Nature and Culture
- 113 The Comparison of Cultures
- 114 Human Origins

Archaeology

- 358 Archaeological Research Methods

Architecture

- 125 Introduction to Architecture
- 251 Beginning Photography
- 353 Large-Format Architectural Photography
- 545 Design and Conservation

Art

- 110 Color, Form, and Space
- 121 Painting
- 123 Landscape Drawing and Painting
- 132 Introductory Silk-Screen Printing
- 141 Sculpture
- 151 Introductory Drawing
- 154 Life and Still-Life Drawing
- 155 Conceptual Drawing
- 161 Beginning Photography
- 163 Advanced Photography Workshop
- 270 Special Studios

Astronomy

- 105 An Introduction to the Universe
- 106 Essential Ideas in Relativity and Cosmology

Atmospheric Sciences

- 101 Basic Principles of Meteorology

Biological Sciences

- 100 General Biology
- 205 Biomedical Ethics
- 240 Plant Physiology
- 278 Comparative Anatomy
- 331 Principles of Biochemistry, Lectures
- 360 General Ecology
- 389 Embryology
- 421 Comparative Vertebrate Ethology
- 432 Survey of Cell Biology
- 471 Mammalogy
- 475 Ornithology

Business and Public Administration

- 590 Communication for Administrators

Celtic Studies

- 400 Introduction to Celtic Culture and Civilization

Chemical Engineering

- 110 Mass and Energy Balances

Chemistry

- 103-104 Introduction to Chemistry
- 207-208 General Chemistry
- 251-252 Introduction to Experimental Organic Chemistry
- 253 Elementary Organic Chemistry

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

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

Communication Arts

- 301 Oral Communication
- 460 Video Communication
- 461 Advanced Video Communication

Economics

- 101 Introductory Economics: Macroeconomics
- 102 Introductory Economics: Microeconomics
- 105 Principles of Accounting
- 308 Public Policy and Microeconomic Analysis
- 311 Intermediate Microeconomic Theory
- 312 Intermediate Macroeconomic Theory
- 320 Quantitative Methods
- 331 Money and Credit
- 333 Theory and Practice of Financial Asset Markets
- 361 International Trade: Theory and Policy
- 368 Comparative Economics: United States, Europe, and the Soviet Union
- 371 Public Policy and Economic Development

Electrical Engineering

- 210 Introduction to Electrical Systems
- 676 Microprocessor Systems

Education

- 400 Field Experience
- 497 Informal Study
- 600 Internship in Education
- 744 Faculty Development: Improvement of College Teaching
- 800 Master's-Level Thesis
- 900 Doctoral-Level Thesis

English

- 135 Writing from Experience
- 136 Practical Prose Composition
- 137 Writing Workshop
- 150 Introduction to Literature
- 151 Reading Modern Literature
- 157 Classic American Authors
- 158 Modern American Authors
- 227 Shakespeare
- 270 The Reading of Fiction
- 275 The American Literary Tradition

289 The Art of the Essay

- 319 Chaucer
- 327 Shakespeare
- 477 Children's Literature

Entomology

- 210 Field Entomology

Floriculture

- Drawing 210 Architectural Sketching and Rendering

Geological Sciences

- 101 Introductory Geological Science
- 102 Introduction to Historical Geology

Government

- 111 The Government of the United States
- 131 Introduction to Comparative Government and Politics
- 161 Freedom and Justice in the Western Tradition: An Introduction to Political Theory
- 181 Introduction to International Relations
- 316 The American Presidency
- 389 International Law

History

- 141 Man and His Values in the Western Tradition
- 201 Introduction to American History: From the Beginning to 1865
- 202 Introduction to American History: From the Civil War to Recent Times

History of Art

- 102 Writing about Art
- 202 Survey of European Art
- 261 Introduction to Art History: Modern Art
- 115 Human Development: Infancy and Childhood
- 116 Human Development: Adolescence and Youth
- 117 Human Development: Adult Development and Aging
- 150 The Family in Modern Society
- 315 Human Sexuality: A Psychosocial Perspective

Industrial and Labor Relations

- Collective Bargaining
- 150 Labor Problems in American Society

Economic and Social Statistics

- 510 Introductory Statistics for the Social Sciences

Organizational Behavior

405 Dramatic Events in Labor History as Told by Those Who Made It

Law

495 The Adversarial Process

497 Family Law

499 Criminal Law

Mathematics

107 Finite Mathematics with Applications

109 Precalculus

111-112 Analytic Geometry and Calculus

121-122 Calculus

123 Analytic Geometry and Calculus

192 Calculus

213 Calculus

294 Engineering Mathematics

311 Elementary Analysis

331 Linear Algebra

370 Elementary Statistics

421-422 Applicable Mathematics

Mechanical and Aerospace Engineering

302 Technology, Society, and the Human Condition

Microbiology

290 General Microbiology, Lectures

291 General Microbiology, Laboratory

Modern Languages and Linguistics

Chinese

180 Introductory Intensive Chinese (Mandarin)

201-202 Intermediate Chinese

English

101 English as a Second Language

102 English as a Second Language

French

101 French Basic Course I

102 French Basic Course II

131 French Elementary Reading Course I

132 French Elementary Reading Course I

203 Intermediate Conversation and Composition

Gaelic

131 Introduction to Modern Gaelic (Irish) I

132 Introduction to Modern Gaelic (Irish) II

German

101 German Basic Course I

131 German Elementary Reading Course I

132 German Elementary Reading Course I

Japanese

160 Introductory Intensive Japanese

403 Teaching of Japanese as a Foreign Language

Linguistics

101 Introduction to the Scientific Study of Language

Spanish

101 Spanish Basic Course I

102 Spanish Basic Course II

203 Intermediate Conversation and Composition

Welsh

131 Introduction to Modern Welsh I

132 Introduction to Modern Welsh II

Music

103 Mainstreams of Popular Music

141 Rudiments of Music

331 Summer Session Choir

Natural Resources

230 Diet for a Small Planet

Near Eastern Studies

101 Elementary Hebrew

113 Colloquial Arabic

142 The World of the Ancient Near East

346 Introduction to Field Archaeology in Israel

Operations Research and Industrial Engineering

260 Introductory Engineering Probability

270 Basic Engineering Statistics

Philosophy

100 Introduction to Philosophy

101 Introduction to Philosophy

131 Logic: Evidence and Argument

145 Contemporary Moral Issues

245 Biomedical Ethics

Physics

101 General Physics

102 General Physics

112 Physics I: Mechanics and Heat

213 Physics II: Electricity and Magnetism

214 Physics III: Optics, Waves, and Particles

400 Independent Study in Physics: Advanced Experimental Physics

500 Informal Graduate Laboratory

510 Advanced Experimental Physics

Psychology

101 Introduction to Psychology: The Frontiers of Psychological Inquiry

107 Emotion and Personal Growth

214 Introduction to Psychology: The Cognitive Approach

325 Introductory Psychopathology

350 Statistics and Research Design

469 Psychotherapy: Its Nature and Influence

543 Psychological Testing

Romance Studies

French 222 French Civilization

Sociology

101 Introduction to Sociology

243 Family

252 Public Opinion and Society: Information and Personal Knowledge

286 Nonverbal Behavior and Communication

Theatre Arts

200 Introduction to Dance

240 Introduction to the Theatre

287 Summer Acting Workshop

Theoretical and Applied Mechanics

202 Mechanics of Solids

Veterinary Medicine

638 The Microscope and Its Use

New York State College of Veterinary Medicine

Administration

Edward C. Melby, Jr., dean
 Charles G. Rickard, associate dean for academic programs
 Lennart P. Krook, associate dean for postdoctoral education
 Robert B. Brown, assistant dean for administration
 Richard Rostowsky, assistant dean for hospital administration
 John C. Semmler, assistant dean for facilities and research administration
 Ann Marcham, assistant to the dean for instructional support and special projects
 Edward J. Trethaway, 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
 Howard Moraff, director of computer resources
 Alexander deLahunta, medical director of the Teaching Hospital
 Charles E. Short, director of continuing education
 Raymond H. Cypess, director of the Diagnostic Laboratory

The College

The College of Veterinary Medicine offers a professional program which requires four years of full-time academic and clinical study of the normal and abnormal structure and function of the animal body and the diagnosis, treatment, and prevention of animal disease.

Graduates of the college receive the Doctor of Veterinary Medicine (D.V.M.) degree, which is recognized by licensing boards throughout the world. Graduates generally enter private practice or become engaged in one of the increasing number of other biomedical activities.

Admission requires a minimum of three years of college work, including specific prerequisite courses and experience. In exceptional cases, outstanding students who have completed all of the prerequisites in two years of undergraduate education may be considered for admission. Applications must be filed approximately one year before the proposed matriculation date. The competition for admission is keen since there are many more qualified applicants than can be admitted.

Graduate programs in veterinary research and postdoctoral training in clinical specialties are open to Doctors of Veterinary Medicine and some highly qualified holders of baccalaureate degrees, and lead to the degree of Master of Science, Doctor of Science in Veterinary Medicine, or Doctor of Philosophy.

More detailed information is contained in the *Announcement of the New York State College of Veterinary Medicine*, which may be obtained by writing to the college.

Anatomy

- 500 **Gross Anatomy** Fall.
- 501 **Gross Anatomy** Spring.
- 502 **Developmental Anatomy and Cytology** Fall.

- 503 **Histology and Organology** Spring.
- 504 **Neuroanatomy** Spring.
- 505 **Applied Anatomy** Fall.
- 506 **Applied Anatomy** Spring.
- 600 **Special Projects in Anatomy** Fall and spring.
- 601 **Advanced Anatomy** Fall and spring.
- 602 **Advanced Clinical Neurology** Spring.
- 700 **Vertebrate Morphology** Spring.

Avian and Aquatic Animal Medicine

- 555 **Avian Diseases** Spring.
- 672 **Aquavet: Introduction to Aquatic Veterinary Medicine** Fall.
- 673 **Diseases of Aquarium Fish** Spring.
- 770 **Advanced Work in Avian Diseases** Fall and spring.
- 771 **Graduate Seminar in Diseases of Aquatic Animals** Fall and spring.
- 772 **Advanced Work in Aquatic Animal Diseases** Fall and spring.

Clinical Sciences

- 475 **Health and Diseases of Animals** Spring.
- 546 **Clinical Orientation** Fall.
- 547 **Practice Management Experience at the Small Animal Hospital** Spring.
- 550 **Applied Radiation Biology and Veterinary Nuclear Medicine** Fall.
- 560 **Clinical Methods** Fall.
- 561 **Obstetrics and Reproductive Diseases** Spring.
- 562 **Obstetrics and Reproductive Diseases** Fall.
- 563 **Large Animal Medicine** Fall.
- 564 **Large Animal Medicine** Spring.
- 565 **Large Animal Surgery** Spring.
- 566 **Radiology** Spring.
- 567 **Clinical Nutrition** Spring.
- 568 **Veterinary Medical Orientation** Fall.
- 569 **Veterinary Medical Orientation** Spring.
- 570 **Theriology** Spring.
- 571 **Clinical Pathology** Fall.
- 572 **Senior Seminar** Fall and spring.
- 573 **Large Animal Clinic** Fall.
- 574 **Large Animal Surgical Clinic** Spring.
- 575 **Ambulatory Clinic** Fall.
- 576 **Ambulatory Clinic** Spring.
- 577 **Diagnostic Services** Fall.
- 578 **Anesthesiology Clinic** Spring.
- 579 **General Medicine** Spring.
- 580 **Radiology Clinic** Spring.
- 581 **Nutrition** Fall.
- 582 **Large Animal Surgical Techniques** Spring.
- 583 **Small Animal Medicine and Surgery** Fall.
- 584 **Small Animal Medicine and Surgery** Spring.
- 586 **Small Animal Surgical Exercises** Spring.
- 587 **General Surgery and Anesthesiology** Fall.
- 589 **Small Animal Medical Clinic** Fall.
- 590 **Small Animal Medical Clinic** Spring.
- 591 **Small Animal Surgical Clinic** Fall.
- 592 **Small Animal Surgical Clinic** Spring.
- 593 **Ophthalmology** Spring.
- 594 **Large Animal Medical Clinic** Spring.
- 596 **Opportunities in Veterinary Medicine** Spring.
- 598 **Dermatology Clinic** 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.
- 679 **Dairy Herd Health** Fall.
- 680 **Poisonous Plants** Fall.
- 681 **Horse Health Management** Spring.
- 684 **Horse Lameness** Spring.
- 686 **Goats: Management and Diseases** Spring.
- 687 **Diseases of Swine** Spring.
- 688 **Special Problems in Small Animal Medicine** Fall and spring.
- 689 **Special Problems in Small Animal Surgery** Fall and spring.
- 690 **Veterinary Dermatology** Fall and spring.
- 691 **Advanced Large Animal Internal Medicine Problems** Spring.
- 778 **Gastroenterology Conference** Fall and spring.
- 779 **Veterinary Gastroenterology** Spring.
- 781 **Advanced Work** Fall and spring.
- 782 **Ophthalmology** Spring.

Microbiology

- 315 **Basic Immunology, Lectures** Fall.
- 316 **Basic Immunology, Laboratory** 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 **Advanced Immunology, Laboratory** Spring.
- 707 **Advanced Work in Bacteriology, Virology, or Immunology** Fall and spring.
- 708 **Animal Virology, Lectures and Laboratory Demonstrations** Spring.
- 709 **Laboratory Methods of Diagnosis** Fall and spring.
- 710 **Microbiology Seminar** Fall and spring.
- 711 **Seminars on Current Topics in Immunology and Microbiology** Fall, spring, and summer

Pathology

- 535 **Veterinary Pathology I** Fall.
- 536 **Veterinary Pathology II** Spring.
- 539 **Introduction to Laboratory Animal Medicine** Fall.
- 540 **Clinical Pathology** Spring.
- 541 **Necropsy Clinic** Spring.
- 635 **Special Problems in Pathology** Fall and spring.
- 636 **Wildlife Pathology** Fall.
- 637 **Postmortem Pathology** Fall.
- 638 **Microscopy** Fall and summer.
- 640 **Principles of Toxicological Pathology** Fall.
- 641 **Clinical Immunology** Spring.
- 736 **Pathology of Nutritional Diseases** Spring.
- 739 **Advanced Work in Pathology** Fall and spring.
- 740 **Reproductive Pathology** Spring.
- 749 **Laboratory Animal Clinical Rotation** Fall and spring.
- 788 **Seminar in Surgical Pathology** Fall and spring.
- 789 **Seminar in Necropsy Pathology** Fall and spring.
- 790 **Special Topics in Pathology** Fall.

- 792 **Immunopathology** Spring.
- 795 **Lectures in General Pathology** Fall.

Pharmacology

- 528 **Basic Pharmacology** Spring.
- 529 **Clinical Pharmacology** Fall.
- 621 **Toxicology** Spring.
- 622 **Special Projects in Pharmacology** Fall and spring.
- 721 **Research** Fall and spring.
- 724 **Physiologic Disposition of Drugs and Poisons** Spring.

Physiology

- The Vertebrates (Biological Sciences 274)** Spring.
- Histology: The Biology of the Tissues (Biological Sciences 313)** Fall.
- Ecological Animal Physiology, Lectures (Biological Sciences 315)** Fall.
- Ecological Animal Physiology, Laboratory (Biological Sciences 317)** Fall.
- 346 **Introductory Animal Physiology, Lectures (also Biological Sciences 311)** Fall.
- 348 **Introductory Animal Physiology, Laboratory (also Biological Sciences 319)** Fall.
- 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.
- General Animal Physiology: A Quantitative Approach, Lectures (Biological Sciences 416)** Spring.
- General Animal Physiology, Laboratory (Biological Sciences 418)** Spring.
- Comparative Physiology of Reproduction of Vertebrates, Lectures (Biological Sciences 452 and Animal Sciences 452)** Spring.
- Comparative Physiology of Reproduction of Vertebrates, Laboratory (Biological Sciences 454 and Animal Sciences 454)** Spring.
- Mammalian Physiology, Lectures (Biological Sciences 458)** Spring.
- Mammalian Physiology, Laboratory (Biological Sciences 458)** Spring.
- Undergraduate Research in Biology (Biological Sciences 499)** Fall and spring.
- 525 **Cellular Mechanisms** Fall.
- 526 **Physiology for Veterinary Students** Spring.
- 527 **Physiology for Veterinary Students** Fall.
- 550 **Applied Radiation Biology and Veterinary Nuclear Medicine** Fall.
- 600 **Graduate Research in Animal Physiology and Anatomy (also Biological Sciences 719)** Fall and spring.

Lipids (Biological Sciences 619 and Nutritional Sciences 602) Fall.

- 620 **Special Projects in Physiology** Fall and spring.
- 626 **Veterinary Animal Behavior** Spring.
- 627 **Acid-Base Relations** Fall and spring.
- 650 **Special Projects in Physical Biology** Fall and spring.
- 653 **Clinical and Research Techniques in Veterinary Nuclear Medicine** Fall.
- 720 **Special Problems in Physiology** Fall and spring.
- 726 **Physiology** Spring.
- 727 **Physiology** Fall.
- 750 **Radioisotopes in Biological Research (also Biological Sciences 616)** Spring.
- 755 **Physical Biology Graduate Seminar** Fall and spring.
- 758 **Molecular Mechanisms of Hormone Action (also Biological Sciences 658)** Spring.

Preventive Medicine

- 330 **The Population Biology of Health and Disease** Spring.
- 331 **Medical Parasitology** Fall.
- 332 **Systematics and Bionomics of Animal Parasites** Fall.
- 510 **Animal Parasitology** Fall.
- 511 **Diagnostic Parasitology** Fall.
- 520 **Preventive Medicine in Animal Health Management** Spring.
- 545 **Principles of Epidemiology** Spring.
- 568 **Veterinary Medical Orientation** Fall.
- 660 **Safety Evaluation in Public Health** Spring.
- 662 **Advanced Epidemiology** Spring.
- 737 **Advanced Work in Animal Parasitology** Fall and spring.
- 766 **Graduate Research** Fall, spring, and summer.
- 768 **Master's-Level Thesis** Fall, spring, and summer.
- 769 **Doctoral-Level Thesis Research** Fall, spring, and summer.

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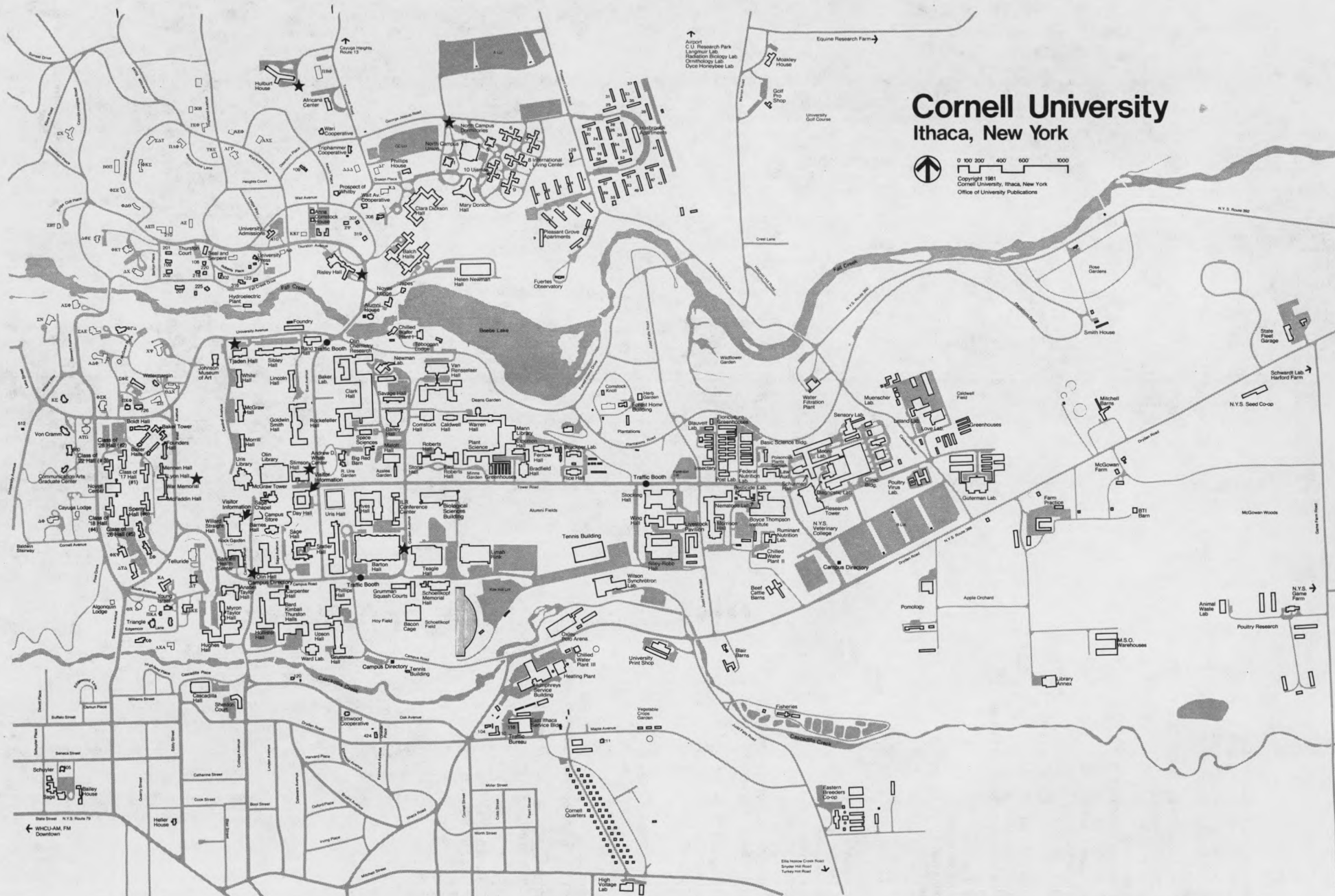
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Cornell University, Ithaca, New York
Office of University Publications

Cornell University Announcements
USPS 132-860
Building 7, Research Park
Ithaca, New York 14850

Second-class postage
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